MOTOR AGE

Vol. XXXII
No. 8

CHICAGO, AUGUST 23, 1917

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Three dollars a year

In This Issue—The Niceties of Motoring

JOHNSON'S Stop-Squeak Oil

Penetrates Between the Spring Leaves Thoroughly Lubricating Them

THE irksome task of jacking up a car, prying apart the spring leaves and lubricating them is forever done away with. You, yourself, can now keep your springs thoroughly lubricated at all times. All you need is Johnson's Stop-Squeak Oil. You don't require a tool of any kind—it isn't even necessary to jack up the car.

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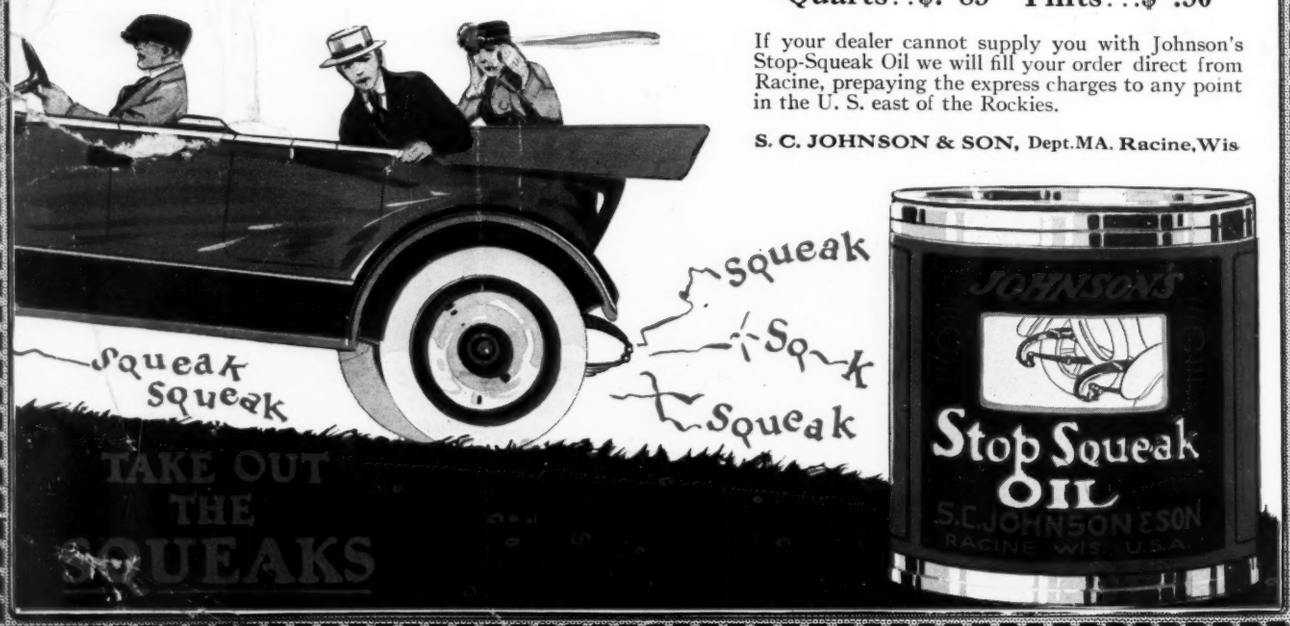

MOTOR AGE

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Contents

NEXT WEEK

The feature of MOTOR AGE for next week will be an article on Motoring with a Camera written from two viewpoints, that of one who has used the camera as an accessory to the car and one who begins to do so.

Vol. XXXII, No. 8 CHICAGO, AUGUST 23, 1917 $3.00 Per Year

MOTOR AGE

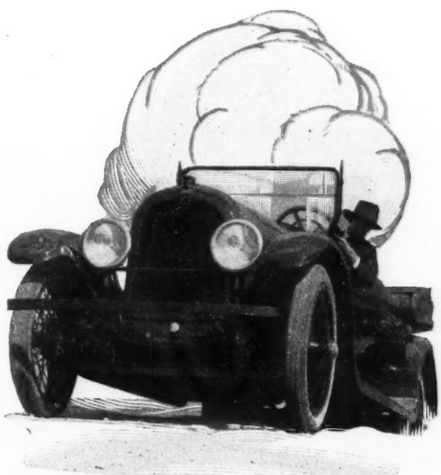
If you are learning to drive, have someone who is familiar with a car tell you what the various parts are for

Niceties of Good Driving

by B. M. Ikert

IF you owned a valuable horse you would not for an instant tolerate the idea of forcing him to trot uphill, nor go for a single day without proper nourishment. Your motor car, in the majority of cases far more valuable than the horse, demands the same careful treatment and nourishing. Be considerate of the machine you drive; treat it as your pet and you will be surprised how it will reciprocate the attention you give it. In spite of what some motorists might tell you, remember that it is no disgrace to shift back to second gear on a hill. It is far easier on the car and after all none of us are in such a hurry but what we can spare a second or two to shift gears and give the engine a fair chance. Every one who drives a car has, perhaps, within him the faculties of becoming an expert driver, yet very few ever get to this stage of the game, simply because they see no necessity for it and believe that all there is to the art of driving consists merely of shifting gears and giving her gas.

Every new car that is sold means that some one is going to drive it and each day brings hundreds of newcomers to the ranks of the motorists. Naturally the majority of these are not cognizant of the many pitfalls which exist in one form or another on the road and which might prove not only annoying, but actually disastrous at times, especially to the novice who has not been previously warned. Road mishaps can usually be traced to insufficient attention or grooming of the car, or to a gross transgression of the rule of the road. The really good driver seldom gets into trouble and if he does it is pretty safe to assume that it is a case of the other fellow not having done his part.



Hill-climbing is an art and calls for wise handling of gears and throttle

Perfection in the art of driving demands that the car owner, first of all, have a clear conception of the mechanism of his car. This does not mean that every one who buys a car must have a complete technical knowledge of the countless parts that go in to make up the modern motor car, but it does mean that every owner, so far as possible, should acquaint himself with the functions of the main mechanical details. Many motorists have but a vague idea as to just what happens in the gearbox or

The correct position when shifting gears—the left foot is holding out the clutch, while the gearshift lever is manipulated with the right hand. Steering is done with the other hand, and it should be noted that the eyes are straight ahead

transmission of a car when the gears are shifted. If they did, certainly there would be less clashing of gears. You can pick out the good drivers from the others for example in any large city when the traffic moves in one direction or the other upon the signal of the officer. The rasping and banging of gears that one hears on such occasions must be a great source of comfort to the repair man, if he is within earshot. Such driving usually results in the car being eventually housed in the repair shop for new gears, universal joints or something similar. The man who is gifted with the art of precise driving can make his getaway without a sound, save that arising sometimes from the gearshift lever striking the gate. This man knows at just what speed his engine should run and just the correct amount of time he must wait before he makes his shifts. Most of us are in too big a hurry to shift; we do not give the clutch shaft sufficient time to slow down and the result is that the gears clash or in some instances cannot be changed at all.

Beginning at First

If you are fortunate enough to be the proud possessor of a new car and have never driven before, there are certain things, relative to the handling of the machine, that you must learn by having someone point them out to you, or by bitter experience on the road. Let us presume then, that you have never driven before and are ready to take the car out of the garage and drive it. You need not be acquainted with each and every part of it to start out with, but there are certain things that you must look after before you go out; and assure yourself that they are right.

First of all remove the radiator cap and see if there is plenty of water in the radiator. It need not be filled clear up to the neck, for the water will expand some when hot and besides, if too full, some of it will slop over the radiator on the outside and mar the finish. This is one reason why you see so many radiators covered with a yellowish substance on top, the result of filling too full.

Next raise the hood and see if the engine has plenty of oil. Every engine is usually fitted with a gage of some sort for the oil and a glance at this will show if the engine is in need of oil or not. For best running the oil indicator should be about half way between the highest and lowest point of its travel. When you are checking up on the oil, look also to the gasoline supply. Sometimes an indicator is placed on the instrument board to show the amount of fuel, but if not it is necessary to remove the filler cap of the tank and look into it. At this stage of the game it is well to test the condition of the storage battery. In fact, a hydrometer syringe should be used regularly. With this instrument you can draw up a quantity of the battery liquid and ascertain its specific gravity, which indicates the state of the charge. The electrolyte or fluid in a fully charged battery should read 1.285, while 1.250 means that the battery is about one-half charged and 1.150 means that it is completely run down. Each week unscrew the vent plugs in the top of the battery and add enough distilled water to bring the fluid to the bottom of the inside cover.

Before you go out, see that there is sufficient water in the radiator

Test the tires with a gage before you start out and see that the readings on the gage correspond with the inflation pressure usually marked on the tire. Remember that tires which are kept well inflated have the longest lives. A tire that is pumped to the proper pressure presents less wearing surface to the road, thus making it less liable to puncture and cuts. Right here it might be said that when on a country road, the driver should turn the steering wheel as little as possible, going straight ahead and not dodging every little stone or obstruction in the road. This is so because every time the front wheels are turned, a severe strain is put on the tire, which is probably a far greater source of danger to its life than the wear incurred from the ordinary roughness of the road.

Finally see that the fan belt is tight as well as all of the electrical connections. Give all of the grease cups a turn and oil the other parts, wherever necessary, with the oil can. You need not bother about the differential housing, as such parts as these have been filled with lubricant at the factory, usually. Of course, in time these will need replenishing. Having made sure that everything is in proper order on the car we can proceed to take it out on the road. Before taking the car out, however, it is a good plan for the novice to keep the car in the garage and practice starting and stopping the engine, also operating the spark and throttle levers, as well as the foot throttle. By thus acquainting himself with the functions of the various parts the beginner will be in a better position to drive when the car is actually under way.

Starting the Engine

To start the engine it is necessary to throw in the ignition switch and give the throttle lever on the wheel a slight opening. If the car is fitted with a high-tension magneto the spark lever should be advanced, as the engine will start better. When cranked by hand the lever is retarded. If the engine is cold it will probably be necessary to pull out the carbureter choke, which will give the engine a richer mixture for starting. In hot weather or when the engine is warm, this should not be necessary. When the starter pedal is now depressed, the engine should begin to fire after a few seconds have elapsed. If it does not start, take your foot off the starter pedal, for if you do not the drain on the battery will be very great.

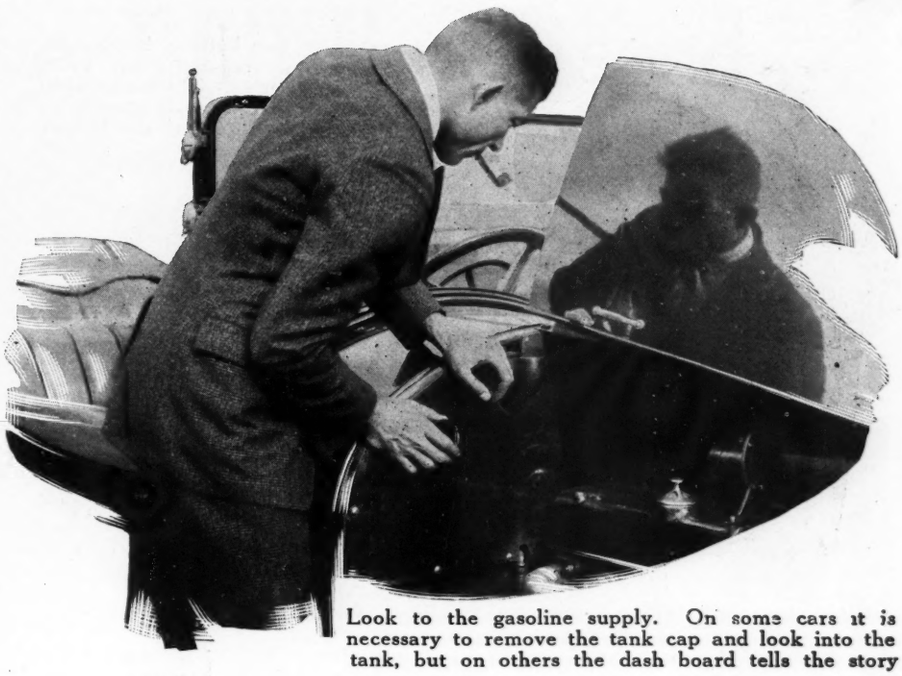
So much for getting the car in shape. We can now turn our attention to actual driving on the road and the beginner should choose for this a stretch of road where there is plenty of room and little or no traffic. Let us take for granted that you have made the proper distinction between the clutch and brake pedals, as well as the various positions assumed by the gearshift lever in its progressive movements from low to high gear. You are seated in the driver's seat with the engine running slowly and wish to start the car. Release the hand brake by pushing the lever forward and with your left foot depress the clutch pedal as far as it will go and after a momentary halt throw the lever

into first speed position. If it does not readily slip into place, take your foot off the pedal and then repeat the operation. Sometimes the gears cannot be meshed owing to the teeth of both being in alignment. By letting the clutch in again, the engine spins the gears once more and the chances are that this time the gears can be meshed. If the lever will not go into place, perhaps your engine is running too fast and the clutch keeps spinning too long, especially if the latter is of the cone type. If you have trouble in shifting to first remove the floor boards so you can see the clutch and let some one take the wheel for a few minutes, so you can give all of your attention to the gears. Place the lever in neutral and with the engine running note the exact amount of motion required of the clutch pedal to release the clutch, if the latter is of the cone type. With a multiple disk clutch it is usually easier to make the shifts and most cars nowadays are so equipped. Now after depressing the clutch pedal try to shift from neutral to the first speed and then allow the clutch pedal to come back very slowly. Do not take your foot off the pedal until the latter is back as far as it will go. When releasing the clutch, give the engine a little throttle, using the hand lever on the steering wheel, as this is much easier for the beginner to manipulate than the foot throttle.

Changing Speeds

The change from first to second can be made at speeds of from 3 or 4 m.p.h. up and the mode of procedure is the same as that above, only in this case the gear lever must pass from the first position through neutral and then into second. In doing this have your mind all made up as to just what you are going to do, and do it all at once. That is, throw out the clutch, wait momentarily and quickly throw the lever into second through the neutral position. Then as you release the clutch pedal give the engine a little more gas so it can take care of the added load. The exact period of time necessary to wait after releasing the clutch pedal, so that a silent shift might be made, varies with every car and the driver must find this out by experiment. The length of this pause also varies with the speed of the car at that particular time. The final shift from second to high usually presents no difficulty, for it is not necessary to go through neutral to effect this. When you get so that you can shift noiselessly, replace the floor boards and take the wheel yourself and practice shifting while you also steer the car.

Do not look down at the gear lever when you make the shifts, as this may cause a serious mishap, especially when the car is traveling quite fast. The correct position of the body when changing gears is the left foot on the clutch pedal, right foot on the floor of the car, unless you are using the foot throttle, left hand on the wheel and the eyes straight ahead on the road while the right hand is operating the gearshift lever. Gradually you will find that your feet will automatically locate the various pedals and in the same way your hand will instinctively reach out for the gear lever or brake lever as the case may be. While driving do not keep your feet, especially the left one, near the clutch or brake pedals unless it is necessary that they be used. The reason for this is plain. Suppose you kept your left foot just above the clutch pedal as though you were ready to use it instantly. You may find that gradually your foot tires and rests upon the pedal, even though you have no intention of depressing it. The partial weight of the foot will cause the clutch to be slightly thrown out and you may wonder why you are not travelling as fast as you would like to. There are countless drivers who drive in just this way and one of the little nicities o fdriving that you must learn to master early is to keep your left foot squarely down on the floor of the car away from the pedal. When driving in traffic it is obviously impossible to do this as the clutch must be used frequently.

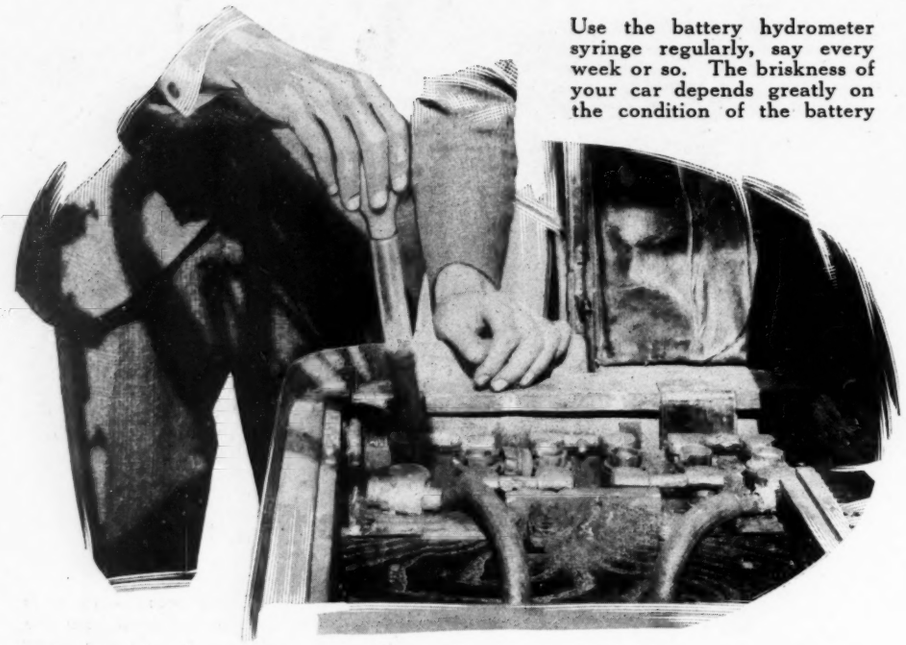


Look to the gasoline supply. On some cars it is necessary to remove the tank cap and look into the tank, but on others the dash board tells the story

Use both brakes when you drive. That is, do not rely solely upon the foot or service brake whenever it is necessary to check the speed of the car. Just because the hand brake is called the emergency brake is no reason that it should be used only when the driver is in danger of collision. Of course, usually when the driver stops his car for any length of time he sets the hand brake and this is fully permissible, but why not use the same brake in place of the foot brake at times and save the wear on the latter. Most of the hand brake levers on modern cars are set at a convenient angle so that they can be easily reached, but the majority find the foot pedal so handy that they hate to go to the trouble to reach for the hand brake and consequently the foot brake lining must suffer. Avoid using the brakes as much as you can and try to so gage the speed of the car that you can coast to the place where you desire to stop, or if you merely wish to slow down the car, do so by partially closing the throttle. When going down a steep hill there is no better brake than the engine of your car and it is a pity that more drivers do not take advantage of this fact. By switching off the ignition at the top of the hill and with the clutch in, almost any degree of braking may be obtained by throwing the gear lever in low, intermediate or high position. When you do have to use either the foot or hand brake to check the car speed apply them intermittently; that is, do not jam the pedal or lever down hard in one effort. If you have ever watched a locomotive engineer set his brakes, you will probably recall that he does not apply all of the braking power at one time, but a little at a time, until the train halts. Similarly the brakes of a motor car should be applied and a better stop and one that is easier on the whole car mechanism will result.

When a quick stop is to be made and the brakes have to be applied, first throw out the clutch, so that the

You cannot tell the pressure of a tire by looking at it. A gage is the only safe way



Use the battery hydrometer syringe regularly, say every week or so. The briskness of your car depends greatly on the condition of the battery

brakes need only to kill the inertia or movement of the car and not that of the engine also. In other words do not brake against your power. It is not necessary to always push out the clutch when the brakes are applied, unless the car speed drops considerable below that demanded by the high gear. Even if it does, you will not have to shift to second, for you will cause the engine to speed up and take care of the load. The beginner should be cautioned, however, against slipping the clutch too much, as it may cause rapid wear of the clutch facing.

Use Clutch Wisely

Good driving demands a judicious use of the clutch. For instance, when you approach a railroad crossing or any other form of obstruction, if you would be branded as a good driver you will slightly accelerate the speed of the car by opening the throttle and coast over the tracks, having meanwhile closed the throttle to prevent the engine from racing and throwing out the clutch to take the jolt from the engine. When you see a bit of rough road ahead, see if you cannot do the same thing—coast over it. By releasing the clutch and allowing the momentum of the car to carry you across, the engine will be strained less and riding comfort will also be increased. Remember whenever you throw out the clutch to also close the throttle, as otherwise the engine, which now has no work to perform, will immediately let the car bound ahead with the jerks very annoying to the occupants of the car. Skillful driving calls for a smooth operation of the car at all times and sudden starts and stops must by all means be avoided.

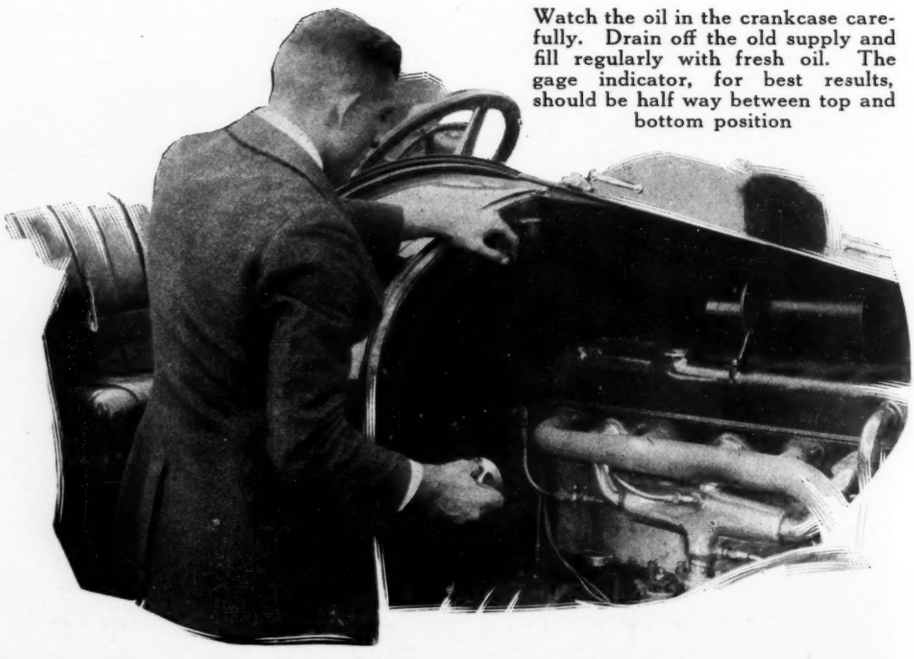
Climbing hills is an art and not merely a matter of shifting gears and opening the throttle. In climbing a hill there are two things to remember; first, shift to second early and quick enough, letting the clutch in smartly; second, retard the spark before the engine begins to knock. This is a common fault with many drivers. If you see a hill ahead which appears very steep and you feel that you are not going to make it on high, shift to second before you come to the bottom of the hill. The idea is to let the engine turn over so that a greater horsepower will be available and if the high gear is left in too long, the engine may be unable to pick up properly when the lower gear is engaged. Don't imagine that abnormal wear is taking place in your engine just because it is turning over fast in this case, for the deteriorating result is not half so great as when the engine is allowed to run slow with a big load.

Shifting from high to second or second to low, as on a hill, for example, it is necessary to depress the clutch pedal only enough to allow the engine to speed up so that the countershaft of the gearbox will be allowed to speed up to the revolutions required by the lower gear. The shift can be made quickly, for it is not necessary in this case to wait momentarily as when shifting from low to second or second to high. The driver should learn these two things: When shifting to a higher gear the countershaft must be given a chance to slow down, and when shifting down, the engine speed must be increased.

If a stop is to be made on a steep hill, the clutch should be disengaged to keep the engine going and the foot brake applied at the same time. The emergency brake should now be set and the change speed lever placed in neutral. The trick in starting up again from this position is to keep the car from rolling backward while the clutch is being let in. This can be done successfully if the clutch is thrown out, the gearshift lever placed in the low speed and then as the clutch pedal is allowed to come backward, slowly releasing the emergency brake. Another way is to hold out the clutch pedal with the left foot while the right foot is applied to the brake pedal, after which the emergency brake is released. The car is now being held by the foot brake and after the gear lever is placed in low, the engine can be accelerated by using the hand throttle, at the same time taking both feet off the pedals.

Stopping on a hill brings up a phase of driving sometimes encountered by tourists, which calls for quick thinking. It is the predicament of finding that the brakes, upon stopping on a hill, do not hold the car and the car begins to back down. Should the brakes not hold the first few yards, when the car is getting momentum, there is less and less chance for them holding sufficiently to arrest the progress of the car later on. Two courses are left for the driver in this event. If there are passengers in the car, one or more of them can get out and find a large stone or piece of wood to place under the rear wheels. This usually helps if the car is not going too fast. The alternative consists of picking out a spot on the side of the hill and backing the car into it, placing it crosswise on the road.

Next week other points in driving will be taken up in an article giving special attention to the tools deemed essential in attaining all the niceties of good driving.

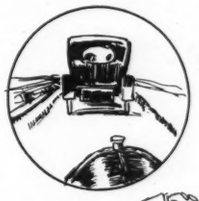


Watch the oil in the crankcase carefully. Drain off the old supply and fill regularly with fresh oil. The gage indicator, for best results, should be half way between top and bottom position

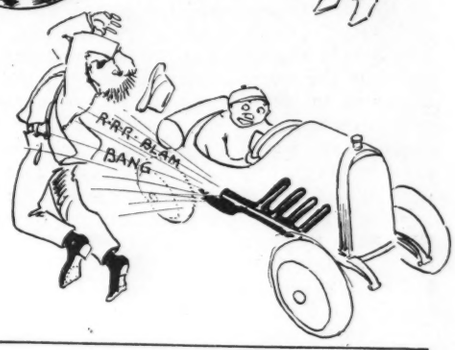
They Never Will Be Missed

By J. P. McEvoy

(with a genuflexion to Gilbert)

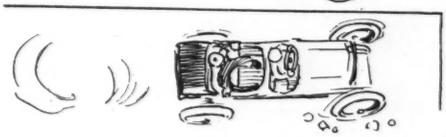


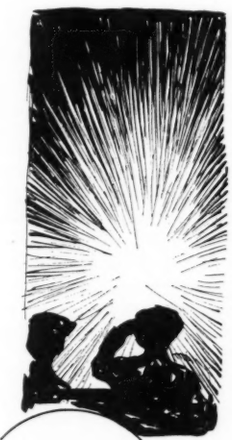
THE day of retribution isn't very far ahead,
So I've made a little list—I've made a little list
Of motorist offenders who'll be shot until they're dead,
And who never will be missed—who never will be missed!



There's the pestilential person who can take a hill on high,
And the ghoul who hogs the middle and who will not let you by,
And the bird who never, never, oh he *never* shifts his gears,
And the one who has a cut-out that can scare you into tears—
And the nut who's always racing—on *that* filbert I insist—
For he never would be missed—he never would be missed.

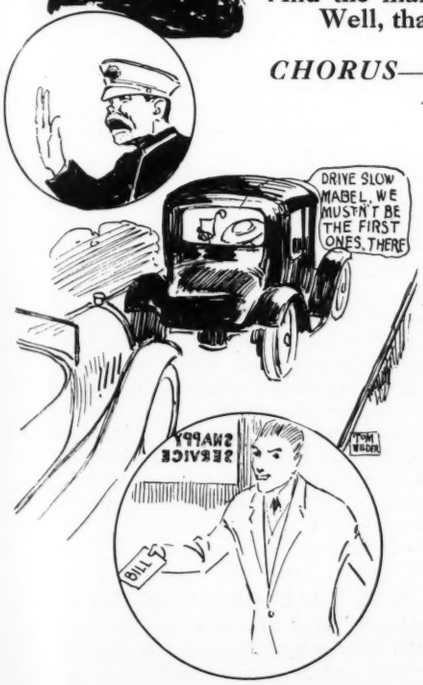
CHORUS—He's got 'em on the list—he's got 'em on the list
And they'll none of them be missed—they'll none of them be missed.





There's the one who tries to scare you when you're riding as his guest,
Well I've got *him* on the list—you can bet he's on the list
And the prune who bumps your tail light when you're signaled with the rest,
He never would be missed—he never would be missed.
And the gonnif who, when passing, always passes to your right,
And the boob who loves to blind you with his brightest light at night
And the one who drives in front of you and gives you all his dust—
I'd love to bounce a dornick on his everlasting crust—
And the man who has *no* troubles—never had 'em, he'll insist—
Well, that guy would not be missed—I'm *sure* he'd not be missed.

CHORUS—He's got them on the list—he's got them on the list
And they'll none of them be missed—positively not be missed.



There's the man who gets his thirty miles with every gal. of gas,
The mendacious motorist—I've got *him* on the list,
And the women in electrics who will never let you pass,
They never would be missed—they *never* would be missed
And the crossing cop who bawls you with a raw and raucous sound,
And his brother on the 'cycle who is always snooping 'round
And garage men who abstract your tools when you are in their lairs,
And the snappy "service" people—how they soak you for repairs!
If you think of any others *you* can put them on the list
For they'd none of them be missed—they'd none of them be missed.

CHORUS—You may finish up the list—you may finish up the list
For they'll none of them be missed—they'll none of them be missed.

When the Soldiers Are at War the Citizens Are at War

Car War Tax Is Changed

Makes Selling for $2,000 and Over Pay More Under New Scale

Estimate Places $40,000,000 as Total Revenue

WASHINGTON, D. C., Aug. 18—The war tax on motor cars has been acted upon by the Senate in committee of the whole and is now practically ready for the House. The Senate changed the recommendations made by the committee on finance in such a way as to increase the tax on the more expensive machines, and the section as approved now provides that motor vehicles shall be taxed, with the exception of those used exclusively for business, as follows:

Motorcycles, $2.50; cars costing less than $500, $5 annually; between $500 and $750, $7.50; betwen $750 and $1,000, $10, with $5 additional for each $500 up to $3,000, and $10 for each $500 above $3,000. These rates differ in few respects from those quoted in MOTOR AGE of June 7. Cars over $1,000 and not over $2,000 originally were to be taxed $15; over $2,000 and not over $3,000, $20; $3,000 and over, $25.

The original provision to the effect that for each year's use of a machine the tax shall be reduced 10 per cent up to a gross allowance of 50 per cent was not changed.

It is estimated that a total of $40,000,000 in taxes will be raised on cars in the hands of private owners, now that it is proposed to make, for instance, a motor car which cost $6,000 pay $90 more than was provided for originally.

AID MILITARY TRUCK DESIGNERS

Detroit, Aug. 20—A. A. Gloetzner, sales, service and Detroit factory manager of the Covert Gear Co., and an official of the Hinkley Motors Corp., together with J. D. Harris, of the McCord Mfg. Co., Detroit, A. W. Coplant, of the Detroit Gear & Machine Co., K. W. Hooth, of Fuller & Sons Mfg. Co., Kalamazoo, and Carl Clement, of the Bock Bearing Co., Toledo, have been called to Washington to assist in the designing of standard military trucks.

FORD ACTIVE IN WAR WORK

Detroit, Aug. 17—The Ford Motor Co., according to a statement made by Henry Ford, is manufacturing 200,000 airplane cylinders of steel for the United States Government to be delivered at the rate of 1000 a day at cost price. The company just recently has developed a method for making the cylinders cheaply, and the government is securing the benefit of this new method. Mr. Ford has left the matter of price to be settled by the government after the cylinders are made, the government and Mr. Ford to figure the cost and the government to pay for them without profit to the Ford company. The price, it is said, will be very low. Mr. Ford states that it costs very little more to produce steel now than it did before the war and this, plus his new manufacturing method, will cause the low price.

With regard to exemptions, Mr. Ford said: "We will not ask exemptions for any of our men. We will save the places for those who are drafted. If we are in business when the war is over, they will be."

E. DeCartier, envoy extraordinary and minister plenipotentiary of the king of Belgium to this country, has requested Henry Ford to send tractors to Belgium. The request has been granted, and several tractors soon will be forwarded to portions of Belgium outside of the lines, where the people will be educated to use them to replace the farm animals of which there is now a great shortage. Henry Ford & Son also are manufacturing 6000 tractors for England on direct orders from the British government.

TIMKEN MAN MADE MAJOR

Detroit, Aug. 20—W. H. H. Hutton, purchasing agent for the Timken-Detroit Axle Co., has been given a commission as major as a result of his work with the Aircraft Production board.

HEASLET TO AID COFFIN

South Bend, Ind., Aug. 18—James G. Heaslet, formerly vice-president in charge of engineering and production of the Studebaker Corp., has gone to Washington to accept a position with the aviation section of the government under Howard E. Coffin.

COLE ANNOUNCES INCREASE

Indianapolis, Ind., Aug. 18—The Cole Motor Car Co. will increase the price of its eight $200 Sept. 1. This is the third raise this year, the other two being Jan. 1 and April 1, and is due to increased cost of production. The new price will be $1,995.

RAINIER UP $145 SEPT. 1

Flushing, N. Y., Aug. 18—The price of the Rainier chassis will advance from $850 to $995 Sept. 1. The E-type extra body will sell for $115, the S panel body for $135, the A panel body for $150.

War Fees on Cars

The following figures are all based on the present price of the largest touring models of cars named. A 10 per cent reduction on the list price is made each year up to 50 per cent, which would decrease the government tax.

Name	Cost	Tax
Ford	$ 360	$ 5.00
Maxwell	745	7.50
Dodge	865	10.00
Studebaker Six	1,275	15.00
Overland Six	1,295	15.00
Chalmers	1,350	15.00
Hudson	1,680	20.00
Paige	1,595	20.00
Hupmobile	1,540	20.00
Chandler	1,595	20.00
Cadillac	2,615	30.00
Marmon	3,100	40.00
Premier	2,285	25.00
White	4,600	70.00
Stutz	2,750	30.00
Mercer	3,575	50.00
Winton	3,525	50.00
Packard	3,850	50.00
National	2,595	30.00
Pierce Arrow	6,500	100.00
Pathfinder	3,250	40.00

No Gasoline Control Yet

Only Unforeseen Conditions Will Cause Government to Take Over Supply

New Field Discoveries Make Outlook Brighter

WASHINGTON, D. C., Aug. 20—It is stated on reliable authority that the food control bill will not mean the taking over by the government of the gasoline supply. At one time a report to this effect was circulated as coming from Washington, but while full power is given in the bill, there is no present purpose on the part of the administrator, Herbert C. Hoover, to commandeer gasoline or interfere in any way with the motor car situation unless conditions as yet entirely unforeseen should develop.

Furthermore, the government is urging only the proper use of gasoline by individual drivers and not curtailment of motoring. It is probable that steps will be taken by the administrator toward individual economy of gasoline and toward obtaining the utmost effort of oil producers to the end that crude oil in the greatest possible quantities be developed.

Contrary to the oil situation having a gloomy outlook just now, the weekly reports of new wells opening up in different parts of the country and in Mexico offer encouragement for even the worst pessimist. Discoveries of extensive petroleum measures have been made on the island of Angel de la Guarda in the Gulf of California. This discovery was made by a commission of engineers, who pronounce the field so extensive as to promise to equal anything of the kind in Mexico.

Mexican Discoveries

Mexico is taking steps for the prompt exploration of the island on a large scale, as the discoveries extend to the mainland on the peninsula of Lower California. Both railroad and ocean transportation is available for the new oil fields. The Mexican government has adopted a novel plan of emphasizing the possibilities of its oil fields. An expert photographer has been sent to the Tampico regions to obtain motion picture films of scenes showing the interesting phases of the oil industry.

An agreement just reached between the opposing groups of senators who, by their differences, have held up oil legislation for years, will open up more than 100,000 acres of rich oil lands throughout the country. The development of these lands, which are withdrawn from entry and development by President Taft, will add not less than 15 per cent to the country's oil production, it is estimated, and probably will prevent a possible prohibition of the use of passenger cars and trucks.

1918 TRACTOR COMMITTEE

Chicago, Aug. 21—At a special meeting of the tractor and thresher department of the National Implement & Vehicle Asso-

When the Soldiers Are at War the Citizens Are at War

ciation, held last Friday at the Auditorium hotel, a committee was appointed to consider and make recommendations concerning the 1918 tractor demonstrations. The committee consists of the following members:

E. J. Gittens, vice-president, J. I. Case T. M. Co.; W. H. Haggard, Emerson-Brantingham Co.; Finley P. Mount, president, Advance-Rumely Co.; H. B. Dinneen, John Deere Plow Co., and Dent Parrett, president, Parrett Tractor Co.

No action looking toward the better conduction of tractor meets in the future was taken at the meeting last week. This matter is left to the committee appointed, the members of which will work together with tractor makers and evolve a plan which will be of material benefit to exhibitors in future demonstrations. This plan will be outlined at a meeting of the association to be held in the fall, probably in November.

DRAFT TAKES BUICK WORKERS

Flint, Mich., Aug. 17—The Buick Motor Co., which employs more than 10,000 workers, has 604 men who were called by the draft and requested the district appeal board to exempt six of these, claiming they are necessary to the company. Exemptions were denied in all instances. The positions filled by the men for whom exemption was requested were assistant traffic manager, chemist, track dispatcher, rate clerk, chief cost clerk and the stock chaser.

GRANT AND DENNEEN MERGE

Cleveland, Ohio, August 18—The Grant Motor Car Corp. has acquired the plant and business of the Denneen Motor Co., makers of the Denmo trucks. Denneen stockholders are to receive preferred stock at a price which is said to be more than $100,000. The Grant company has been planning for some time to invade the truck field and decided to purchase the proven product rather than experiment with new models. The Grant factory is to be enlarged and an annual production of 10,000 trucks will soon commence. F. S. Denneen, president of the Denneen company, will be in charge of the engineering and sales of the Grant truck department. The Denneen company has been in business a year and has been making in all ten trucks a day.

ARMY TAGS ARE ABUSED

Boston, Mass., Aug. 18—When war was declared and cars were turned over to various military and naval units the highway commission allowed the commanders to put on tags designating the organization to which it belonged. Because they had on such tags some of the drivers, who owned the cars, thought it exempted them from the motor laws. As a result, Commander Rush, in charge of the Boston naval district, following the arrest of some drivers, has ordered that all cars under his jurisdiction must remove the U. S. N. signs and carry the regular registration numbers.

Low-Priced Move Fast

Cars Selling for $1,500 and Less Unable to Supply Demand

War Orders Not Interfering With Regular Work

DETROIT, Aug. 20—Business conditions in motordom are particularly optimistic with regards to the low-priced car market. Manufacturers of cars selling for $1,500 and less find themselves unable to care for all of the business offered and a few of the makers of cars selling between $1,500 and $2,500 are enjoying the most prosperous business in their histories. War conditions seem to have affected the makers of higher-priced cars only. The Ford Motor Co. is 80,000 cars behind in orders. The Willys-Overland, Inc., enjoyed the greatest business prosperity in June and July in its history. The Buick Motor Co., Maxwell Motor Co., Chevrolet Motor Co., Dodge Brothers, Reo Motor Car Co., Olds Motor Works, Paige Motor Car Corp., and other companies making cars within the same range of prices are from thirty to sixty days behind their orders.

War orders placed by the Government and by the allied nations are so arranged that they do not interfere with the general production of passenger cars and trucks or parts. The orders being placed give promise of a continuation and increase of employment to labor throughout the country. And large manufacturers in consequence are optimistic with regard to future business. The only cloud on the horizon is that of the cost of gasoline and this is viewed with hope, as it is thought the government will take steps to insure suffieient production and a reasonable price.

Chicago Races Labor Day

Speedway Plans Three Events for Date Given Up by Cincinnati

CHICAGO, Aug. 21—Speedway racing on paper is almost as extensive as were actual races before this country came into the world war, but many of the proposed races this year have flickered out at the last moment. Cincinnati's Army and Navy Sweepstakes is an example. This race was scheduled for Labor Day and rumor gives various reasons for cancelling the meet, some of which were not very complimentary to the Cincinnati management.

When it became apparent that there would be no race Labor Day at Cincinnati, the Chicago Speedway asked for a sanction on that date. This marks the third date asked for by the local speedway within the last few days. Originally the Chicago Speedway asked for Sept. 22, which was thought to be a good date inasmuch as that would be the week of tne accessory show for Fords in Chicago. Then Sept. 15 was asked for when rumor had it that the Providence races might be postponed or cancelled. Now application has been made for Labor Day and sanction has been given. In the meantime it occurred to the officials of the local speedway that a week of racing beginning Labor Day and terminating the following Saturday would stimulate interests and also give the drivers an opportunity to cash in on what otherwise has been a weak season for them.

As this is being written, the local promoters are still waiting for a sanction for Sept. 8. It is proposed to hold three races Labor Day—50, 100 and 150 miles—each race to carry a certain number of points and the winner of the greatest number of points in the three events to be declared the victor. If sanction is given for Sept. 8 the Grand American will be run on that date, this being 300 miles, and effort will be made to put on a challenge, or match, race on Wednesday of that week. In case the Providence race falls down, this being scheduled for Sept. 15, drivers may be held over for a race Sept. 22. There are a good many "ifs" in the proposed races at Chicago, and what the ultimate result will be is not clear to anyone just now.

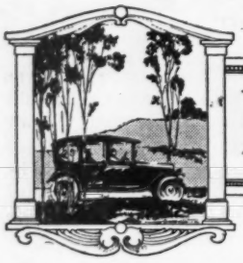
SILVER-APPERSON FOR GOTHAM

New York, Aug. 17—In order that he may have a quality car which meets his own requirements, C. T. Silver, for years a figure in the New York trade, has arranged for the production of the Silver-Apperson. This will be manufactured in the Apperson factory, Kokomo, Ind., will include practically a stock Apperson eight chassis but will have a body and certain other specifications which will make it practically a special car for distribution in the New York territory. It will make its appearance at the New York show in January.

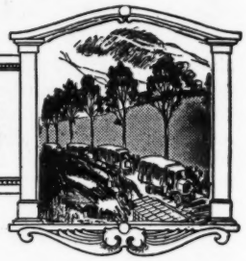
The Silver-Apperson will not be sold except through Silver's organization. It will incorporate features that have been found in the best imported and American cars and will sell for approximately $1000 more than the regular Appersons. Silver has had a plan similar to this in mind for a long time.

OWNERS HELP AMUSE SOLDIERS

Washington, D. C., Aug. 17—The car owners of this city have inaugurated a new idea in army motor service. Motor cars are to be furnished without charge to transport entertainers to the military camps on certain nights of each week. The members of the amusement profession are in turn offering their services to the end that the officers and men in the various camps may find pleasure in their "time off." The movement of Washington owners to furnish motor cars for this purpose is expected to become general throughout the country wherever cantonments or other military camps are located.



EDITORIAL PERSPECTIVES



Henry Ford's Tractor

THE agricultural world has been waiting for Henry Ford's tractor, and tractor makers as well have been waiting for it. The taking up of the Ford tractor by the British and French governments has forced a greater realization of this tractor on the American farmer and the American tractor industry than seemed possible a year ago when it was demonstrated at the tractor demonstrations at Fremont, Neb. At that time many criticisms were launched against the Ford machine, but since then other designs incorporating similar features have been brought out and have demonstrated that constructions which the old-line tractor maker considered impractical are not only practical but highly desirable.

HENRY FORD has taken the tractor matter most seriously. It is questionable if he is not taking it much more seriously than he took the development of his Ford car many years ago, if such is possible. He has aimed to give the farmer a machine capable of doing the job and yet furnishing a simple, stable and accessible machine. That he succeeded in making such a motor car years in advance of any other maker is conceded. Then he declared that he set out to build a machine good enough for any American citizen; he did not limit it to the American farmer, but to the American citizen. He set this fact forth very clearly to MOTOR AGE's editor when he displayed his car for the first time in the New York armory at the motor car show thirteen years ago. How close he shot to the real mark is shown by the success his plans have achieved in the thirteen years between then and now.

WITH such success in the motor car field it is not surprising if he will not attain even greater success in the tractor field. This may explain why many makers in the tractor field to-day already are launching criticisms at Ford's designs and Ford's construction. He has a two-plow machine which is less than half the weight of machines that are pulling three plows to-day. It is hardly possible to make weight comparisons between the Ford tractor and other two-plow machines, as there are so few of them. Ford has not copied existing tractors in his new machine. It is a new job, a lightning flash from clear sky of tractor engineering. There is scarcely any precedent for not a few of the features. It is no wonder then that criticisms should be very general. Just how Henry Ford will come out cannot be predicted, but the next year or so should unfold the answer.

WITHOUT doubt the present Ford tractor is going to work a great influence on tractor design. While no price is fixed it is certain that the aim has not been to build a machine so much cheaper than everybody else's but rather to build a good machine, a reliable machine and one with the finest materials and good workmanship. Anti-friction bearings in general are very much in contrast with the plain bearings so generally used by the old-line tractor makers. The entire inclosing of all parts is in direct opposition to old-line tractor manufacture but in step with the more modern tractors of the last year or so.

THE Ford machine champions the new school of tractor design in which the inventor has worked for smaller parts made from good materials, properly inclosing them from farm dust and mounting them on anti-friction materials. Thus he has small-diameter rear wheels, 42-in. inclosed worm-driven rear axle, and all transmission parts, gearset gears, etc., as well, inclosed as in a motor car. They should be better inclosed than in a motor car if such is possible. The old-line tractor maker has clung to the very large-diameter rear wheels, perhaps 60 or 96 in. in diameter. These wheels are generally driven by very heavy exposed cast-gear trains. The gearsets generally are made of large heavy cast gears, not always inclosed but perhaps with a covering over the top of them. Too often the clutch is not inclosed. Such construction with very large rear wheels means very heavy gears, all of which means the heavy machine of 5000 or 6000 lb. The controversy between these two schools is at its height to-day. The old-line maker is waiting to be convinced. We hope the new-line maker is stoutly preparing for the conflict that is ahead of him. The farmer will await the result of the next year or so with particular interest. Henry Ford has entered the tractor industry at a most opportune time, a time when it seems expedient that these tractor engineering problems be solved once and for all.

Enjoying the Tour

MOTOR AGE congratulates the Owego Automobile Club in New York state for its unique motor rest, which the club has built in one of the prettiest parts of the section. Alongside the road on a high shaded bluff the club has made a veritable noonday rest, where the motorist tourist can enjoy the noonday lunch around shaded rustic tables and enjoy the famous Southern New York state panorama of winding river, valley and hill. This rest idea adds a new chapter to motor touring and a most excellent one. Scores of tourists take their noonday lunches with them, but they have lacked the missing link, namely, the ability to select the proper spot for lunch and the necessary conditions to enjoy it.

WE suggest that every motor club in the country adopt the Owego idea of a noonday motorist rest. Pick out the finest position on the through routes of your territory. Fix up the position with a few rustic seats, a few tables, and if you feel energetic, like the Owego people, add a well-built wood dining shed open on four sides, and also add a stone cooking oven, a small ice house to cool the running water and the other conveniences that go with such a noonday rest.

TOURING should increase the love of the tourist for the country. You can accomplish this better if you let him have some quiet noonday rest, where he can sit and quietly absorb the beauties of the finest spot in the county. You can tell him about this by a few signboards scattered along the road, for 10 or 15 miles in all directions from the rest. Too often the holiday tour becomes a mileage contest rather than a tour. The noonday rest will do much to stop this wild chase of burning gasoline and wearing out tires. Go through the country and see it. Pause to drink in its attractions. Hesitate long enough to rest yourself and your party. Touring is not simply miles covered but rather inspirations gained. Too often the tourist returns home tired instead of recuperated. The noonday rest is worth while. It should become general in every state, and soon.

Engineers' Place in the War

"THIS is a war of engineers." Just what does this oft-quoted phrase mean? Capt. Gustave P. Capart of the general staff of General Petain who is at present in this country as a member of the French scientific commission, indicates that the answer of this question involves a new understanding of what military operations are and what they mean.

WHEN it is stated that this is a war of engineers, that statement means that the old military lines of organization have practically been thrown aside at the front, and in their place have been built up a specialized industrial organization whose business is war. We no longer have infantry, cavalry and artillery in the old sense of the words. We have a planned organization for offensive military operations, in which the plans are made on an engineering basis, in which the fighting is done in many branches of the service by engineering methods, and of which the operations are carried on by engineering work in roadmaking, in transportation, in industrial management and factory operations.

Captain Capart, in an interview with the *Electrical World*, points out that this war is being fought with prime materials. Old warfare was a football game compared with the modern struggle, in which tons of material are hurled back and forth between opposing armies and carloads of foods, of machinery and supplies and of men are constantly transported to the line of action on both sides.

The modern battle, Captain Capart states, is a problem of roads and a problem of transport. In the maintenance of railways and roads, as well as in the construction of new extensions, a large and highly trained personnel is required for the laying of tracks, for repair shops, drivers and conductors, for the handling of construction material, etc.

Cableways and telpherage systems have given extraordinarily valuable service at the front. In one installation 600 mules were turned to other service by the installation of a telpherage system. The motor car, with its camions and its tractors, is another link in the service.

The electrical engineer is playing a wonderful part in this war. Great distribution systems for electric light and power have been necessary for the use of armies. The headquarters of the armies, the cantonments, artillery, repair shops, hospitals, air service, etc., all use electric power. Machinery and skilled men are necessary for air compressing, rock drilling, trenching machines, etc.

The government of the United States has comprehended fully the importance of organization of engineers in these many lines, and the engineer regiments which already have responded to the military needs indicate the ability of this country to furnish the class of men needed for the military industrial work.

In this country we must understand that to prosecute the war successfully we must think not only of materials and of human energy in tremendous totals, but we must think of using materials and literally of using human energy with the highest efficiency. Men must be selected for their places in this great industrial war, not on the basis of their physical characteristics alone, not on their ability to carry a gun, but on the basis of special knowledge to fit them for positions of responsibility and of specialized training which this war of engineers demands.

Captain Capart believes that in the United States we have the opportunity to combine the knowledge and the experience of what has been done in three years of war, and that our armies should go to France organized in such a way as to fit them for the industrial task which lies ahead of them. Captain Capart points out that our engineers who go to France as military men in their specialized branches will also be pioneers of American industry in times of peace and will prepare the ground for the economic war which is expected to follow when the military battles are over.

Military operations may be thought of as being conducted today in four zones—first, the firing line; second, the military zones immediately surrounding the firing line; third, the avenues and channels of communication between the military zone and what may be called the world-wide zones of supplies to that military zone, and, fourth, the zones of supplies themselves, which include the countries at war and the countries which are supplying food, machinery and materials for the countries at war.

Captain Capart points out that specialized engineering training is necessary in all these war zones. On the firing line—troops in contact with the enemy—engineers are involved in the strictly military operations, mining engineers are planning the executing of trench work, earth work, concrete work and so on. On this same battle line are engineers who maintain what the French so interestingly explain as a "liaison"—the nerves of communication between the various sectors of the armies, the telephone, the telegraph, the semaphore, the wig-wag system, wireless, heliograph; in short, the co-ordination of communication by every means known to science.

In the same way Captain Capart has indicated that engineers with their specialized knowledge are needed especially in the great problems that touch upon the transportation of the necessary materials between the military zone and the sources of supply which constitute what we have called the fourth great zone.

When the Soldiers Are at War the Citizens Are at War

Restricts Plane Export

Government Conserves Aircraft for Itself and Allies—British Order 5000

American Aviation Service Places Contracts Abroad

CHICAGO, Aug. 20—Each week sees a new step in the aviation industry which makes that day when the commercial flight foreseen by aircraft experts seem much nearer. The government has prohibited airplane exports to neutrals except by license to conserve the supply for itself and its allies. Ford has entered into the manufacture of airplane parts and will deliver 200,000 airplane cylinders to the government at the rate of 1000 a day. And word has at last come from Washington that the aviation engine which automotive experts have been working on night and day to perfect has stood the test.

The war has developed the industry until with it has come a new means of transportation, aerial, which has become practical. Europe, as well as the United States, is wondering what will be done with the airplanes when the war is over. The vast industry created in the last three years to support this means of locomotion should not die after the war, and commerce is expected to adopt its products after the war. Already Mexico has established what is claimed to be the first regular mail service by airplane in the world, though Italy claims the distinction of launching an airship service with planes carrying forty passengers before this. The Mexican service extends from Mexico City to Vera Cruz, from Mexico City to Queretaro, and from Mexico City to Pachica, the first being covered in 4 hr., the second in 2 hr. and the third in 45 min.

A Fighting Weapon Now

The United States and most of Europe are thinking of the airplane as a fighting weapon just now. During the last few days dispatches from the battle front tell of successful flights over the Rhine, the sting of the airplane's bombs back of the German lines, all of which points to air control and victory eventually.

The British government has placed an order for 5000 airplanes with the Curtiss corporation. The order is at the rate of $29,000 each, or $145,000,000 for the entire order. So far has the Curtiss company developed its factory that it is expected to be able to produce from $6,000,000 to $8,000,000 worth of parts a month by the last two months of this year. By the first of 1918 it is thought business will run close to $10,000,000 a month, and if present plans do not fall down the ultimate capacity will be $12,000,000 a month. The government expects $150,000,000 worth of business from Curtiss next year. There is said to be $200,000,000 worth of business for the company if it can take it.

Meanwhile the American aviation service in France has placed large contracts for airplanes abroad, and deliveries are to begin soon. The American aviator observers who were sent to the British, French, Italian and Russian fronts are prepared to make a detailed report on aerial warfare as carried on by the allied armies.

The mechanism of the airplane engine developed at Washington is being guarded with the greatest care. It can be said that the engine is an adaptation of principles underlying other engines on an intensified scale and has proved by tests it can drive a plane faster than any engine that has ever been developed. Speed has become the prerequisite to control of the air. With the perfection of this engine on standardized lines, such as its structure permits, aircraft experts believe the United States can push its aviation program rapidly.

Just now the government is undertaking a campaign in the way of an appeal to trade schools, manual training schools and all schools with shop-work equipment to prepare to meet the nation's need for skilled mechanics and high-grade helpers. Courses of intensive training along the lines of automotive interests are most vital at this time, as the army needs mechanics and helpers for cars and trucks as well as for airplanes. The training suggested includes that for automotive mechanics, blacksmiths, chauffeurs, draftsmen, electricians, steam engineers, gasoline engineers, machinists and so on.

Tourists Adopt Yosemite

Cars of Private Owners Prove Greatest Human Carrier Into Park

CAMP CURRY, Cal., Aug. 17—Three things mark the 1917 season in Yosemite National park, and the most noticeable of these is the triumph of the motor car. And as the great human carrier into the Yosemite park and valley the private motor car has won over the combined facilities of railway car and motor stage. Up to Aug. 1, 3435 private cars had entered. The season's score of visitors and the kind of transportation they used so far is as follows:

	May	June	July
Private cars	568	4770	6984
Motor stages	1218	4078	3500
Hikers	138	93	....

All California seems to have discovered the park as a camping place for a one- or two-day drive from home. Several thousands of state residents have come for a week or a month, 4002 of them coming to Camp Curry in July. The Tioga road, which leads through Tioga Pass, 9940 ft. up in the Sierra's summit range, has only been open since July 20, but in the first two weeks 220 private cars used that route.

The other two things that mark the season in Yosemite are the women hikers and the children. The women who hike wear trousers or some form of bloomers. Children have been brought to the park as never before—another score for the motor car, for most of them have come in the private cars that help mark the season.

June Exports a Record

Increase of Motor Cars, Trucks and Parts Reaches Sum of $2,599,418

Great Britain and Canada Are Largest Buyers

Months	Cars	Value	Trucks	Value	Parts
		1917			
June	7609	$5,721,494	1245	$2,965,254	$2,766,960
May	6725	5,489,980	1764	3,216,620	2,715,696
		1916			
June	4905	3,416,396	1416	3,551,148	1,886,746

WASHINGTON, D. C., Aug. 17—Though the motor car, truck and parts exports for June show less increase over May than May did over April the increase is continued enough to rout any feeling that the war and the submarine fatalities are "killing" the export trade in motors. The exports for June were $11,453,708, as compared to $11,422,596 in May. Comparison with June, 1916, shows an increase of $2,599,418, of which $2,305,098 was in motor cars and $585,894 in trucks.

A drop from $120,000,866 to $118,243,175 in the eleven previous months, as compared with the same period in 1916, however, shows the results of the various embargoes and restricted use in certain countries. The United Kingdom and Canada continue to be our biggest buyers, Great Britain taking $2,391,023 worth of cars and trucks and Canada, $1,673,758. Most of Great Britain's purchases were trucks.

Australia increased its purchases from $305,431 in May to $584,654 in June. On the other hand, France decreased its purchases from $694,687 in May to $480,154. Asia and Other Oceania were large buyers, taking $894,960 worth. South American countries are increasing their purchases of American cars and trucks each month. Chile nearly doubled its purchases over May, while Brazil, Venezuela and other countries in that part of the world showed increases.

Eleven Months' Record

For the eleven months previous to June $90,958,243 worth of motor vehicles were purchased by foreign countries, of which the United Kingdom, France, Canada and Asia and Other Oceania bought $55,382,409 worth. Great Britain alone took more than $18,000,000 worth, while France purchased $14,691,460 worth. Canada's purchases amounted to $12,088,787 and those from Asia and Other Oceania amounted to $10,093,720. Shipments to Australia were $4,213,874.

JULY PAIGE'S BIGGEST MONTH

Detroit, Aug. 17—The Paige Motor Car Corp. shipped, sold and delivered more cars in July than in any month in its history and was able to fill only about 58 per cent of the orders received during July.

$15,714,971 SALES FOR FISK

New York, Aug. 17—The Fisk Rubber Co. for the half year to June 30 last showed a large gain in gross and net profits. The

When the Soldiers Are at War the Citizens Are at War

total sales for the period of $15,714,971 were only $4,000,000 less than for the entire 1916 year, when they totaled $19,457,788.

Net income, after depreciation and interest, was actually larger for the six months than for the entire twelve months of 1916. The actual net for the six months was $1,983,627, as compared with $1,836,829 in 1916.

As of June 30 Fisk had outstanding three classes of preferred stock aggregating $13,525,000 in amount. After allowing for all the preferred dividends for the period, totaling $473,370, the balance, or $1,510,257, is equal to $19 a share on the $8,000,000 common, or at the annual rate of $38 a share. On the same basis of capitalization Fisk earned in all of last year only a little more than $11 a share on the common. On June 30 last Fisk had net quick assets of $10,726,267.

1720 CHANDLERS IN JULY

Cleveland, Ohio, Aug. 17—The Chandler Motor Co. sold 1720 cars in July, 1917, as compared with 1320 in the same month of 1916. In seven months of 1917 the company sold 12,451 cars as compared with 8236 last year.

CHEVROLET ESTIMATES EARNINGS

Flint, Mich., Aug. 20—Final earning figures for Chevrolet Motor Co. for the half year have not yet been compiled, but it is estimated that on a basis of $70 per car profit operating net would be in the neighborhood of $4,500,000. To this may be added $2,700,000 received in dividends from its General Motors stock holdings. This would be better than $22 a share on its 640,000 shares of stock.

HUPP BUSINESS INCREASING

Detroit, Aug. 20—The Hupp Motor Car Co. has reduced its floating debt by several hundred thousand dollars since March 1 of this year. The company shipped 1301 cars in April, carrying 1804 orders over to May. During May 1550 cars were shipped and 1028 orders carried over to June. In June 1083 cars were shipped and 851 orders carried over to July. On July 15 the company had unfilled orders for 761 cars on its books.

MAXWELL PAYS $30 PER SHARE

New York, Aug. 17—Preliminary estimates of Maxwell Motor earnings for the fiscal year ended July 30, 1917, show net profits in excess of $5,000,000, equivalent to $30 a share on the common stock after deduction of the dividends for the 7 per cent cumulative first preferred and the 6 per cent non-cumulative second preferred. This record of earnings is equal to the showing made in the fiscal year 1916, when 30 per cent was earned for the common as compared with 6½ per cent in 1916. According to directors of the company, the balance sheet as of July 30, will show the corporation to be free of indebtedness at the banks.

Road Couriers at Denver

490 Miles of Military Test Trip Take 33 Hours, Including Stops

Bad Weather Makes Night Driving Difficult on Relay

DENVER, Colo., Aug. 18—Colorado's 490-mile division of the United States military courier test trip by motor car relays from Washington to San Francisco this week over the National Midland Trail was made in 33 hr., including stops, with a climb over one mountain range more than 2 miles high and another lower one and through nearly 200 miles of mud caused by three cloudbursts.

Exceptionally bad weather made the roads extra difficult for night driving in particular, and the first two cars had a combination of darkness and heavy rain for many miles. All three were driven by ordinary motorists from business vocations, who relayed the message across the state on short notice and without any special preparation of themselves or their machines for such a rigid test of endurance.

George W. Skouland, after driving 180 miles from Denver to the Kansas line and fighting rain and mud nearly half that distance, started back westward with the message at 1 o'clock in the morning and covered the 225 miles to Idaho Springs in 11 hr. and 45 min. Charles Woodward, of Idaho Springs, took 15 hr. for the 160 miles from that point to Glenwood Springs, but he climbed over Berthoud Pass at 11,400 feet, crossed one lower range of the mighty Rockies, handled scores of difficult curves along canyon and "shelf" roads and drove through a blinding rain and over treacherously slippery roads a large part of the way. Harry Logan, of Glenwood Springs, then made the remaining 105 miles to Grand Junction, through more winding canyons, in 6 hr.

Colorado's part of this severe test, in particular, is regarded as a favorable demonstration of both the practicability of motor car courier service in America and also of the valuable reserve force among average motorists. It also showed encouraging performance of cars under favorable road conditions and emphasized the need of permanent and dependable highways throughout America for military, industrial or touring use.

HARD ROADS ARE URGED

Denver, Colo., Aug. 18—Extensive building of hard-surfaced roads through western states was urged at the two-day convention session of the National Old Trails Road Association just closed at Pueblo. A Colorado building committee of one member each from Prowers, Bent, Otero, Pueblo, Huerfano and Las Animas counties was instructed to bring about with all possible speed the hard-surfacing of Colorado's 250 miles of the Santa Fe trail across those six counties and to co-operate with like committees from other states toward making this year-'round road a paved highway from coast to coast.

Paving in Kansas received extra urging because several delegates got marooned in that state in heavy rains and missed the convention. Altogether, sixty delegates were reported unable to reach Pueblo in time on account of muddy roads at different points along the route, and this situation was employed overtime as an argument for paved roads for military emergencies and all other highway purposes.

Favorable committee reports were made upon requests from the San Luis valley and Colorado Springs that the Spanish trail westward from Walsenburg through La Veta Pass, Alamosa, etc., be added to the National Old Trails system and that the Colorado Springs-Pueblo road be declared a branch of the Santa Fe trail. Final action by the convention was postponed, to depend upon interest shown by the local people interested in the further improvement of these roads.

The following officers were elected for one year: President, Judge J. M. Lowe, Kansas City, Mo.; first vice-president, C. W. Black, Council Grove, Kan.; second vice-president, C. M. Cotton, Gallup, N. M.; secretary, F. A. Davis, Kansas City. President Lowe and Secretary Davis were each re-elected for the fifth time, having served from the time the association was formed in 1912.

GOTHAM LIKES W-K TAXIS

Toledo, Ohio, Aug. 20—The Westcott Express Co. has followed its initial order of fifty Willys-Knight taxis with a second order for an equal number. The cars are built with special taxi chassis equipped with Willys-Knight engines and furnished with custom-made bodies finished in a special shade of green. Equipment includes spanish hand-buffed leather upholstery with silk shades and carpets in harmony. The roof is sound proof. Baggage space is provided beside the chauffeur. Ventilators, speaking tubes and pamphlet cases are furnished.

CHARTER OAK ATTACHED

Hartford, Conn., Aug. 20—Special telegram—Eastern Motors, Inc., is in the hands of Judge William Larkum, of Waterbury, as receiver. An attachment was placed on the factory by two local concerns. One model of the Charter Oak car has been in the paintshop for two months, and is still there. Silas Hall of Meriden and Willis Upson of Waterbury are the heaviest stockholders. Judge Larkum is attorney for Upson. About $30,000 has been expended under the regime of Vice-President and General Manager Allen Sheldon with no visible results. For some time past creditors have been pressing the company for payment. Sheldon stated when the concern removed to New Britain from Hartford that all capital was paid in and that all the material for the first year's production had been arranged for. There is likelihood of a resumption for operations minus Sheldon.

Putting $6,626,000 on the Map

Illinois Distributes Road Money

SPRINGFIELD, Ill., Aug. 18—Increased activities for road-building and motoring, war or no war, were assured to Illinois, and incidentally to transcontinental motorists, when the state department of public works announced the distribution of $6,626,000 made available by the Federal and state governments for the improvement of roads in the state.

The appropriation will be distributed as follows:

$1,113,000 to the National Old Trail road, beginning at the Indiana state line and running through Marshall, Greenup, Effingham, Vandalia, Greenville, Collinsville and East St. Louis.

$1,020,000 to the Lincoln highway, connecting Chicago, Wheaton, Geneva, De Kalb, Rochelle, Dixon, Sterling, Morrison and Fulton.

$2,215,000 to the Chicago-Springfield road, connecting Chicago, Joliet, Morris, Ottawa, La Salle, Peoria, Mason City and Springfield.

$958,000 to the Springfield-East St. Louis road, connecting Springfield, Carlinville, Staunton, Edwardsville and East St. Louis.

$614,000 to the Dixie highway, connecting Chicago, Chicago Heights, Momence, Watseka and Danville.

$400,000 to the road from Chicago to the Wisconsin line, connecting Chicago, Waukegan and Zion City.

When Available

Of this appropriation, $1,326,000 is available July 1, 1917; $1,326,000, July 1, 1918; $1,765,000, July 1, 1919; $2,209,000, July 1, 1920. It is estimated these amounts will pay two-thirds the cost of improvements on each road. The counties through which the roads pass will be expected to pay the rest. If the $60,000,000 bond issue passes at the November election next year, those counties contributing will be entitled to reimbursement for money contributed now.

Though not directly connecting the cantonment at Rockford and the aviation camp at Rantoul with Chicago, thus making possible greater truck traffic between that city and the camps by improving the main roads in the sections of the state in which those posts are located, access to the training camps will be made more easy by short detours from the improved roads. As an aid to transcontinental motoring the improvements are full evidence, as all are of roads of national importance.

The highways where the money has been routed

K. C. MOTOR TRAFFIC NORMAL

Kansas City, Mo., Aug. 17—The street car strike here ended yesterday and service was resumed this morning after one day of partial and eight days of total suspension of street car service. Transportation by motor vehicle probably cost $15,000 or $20,000 more a day than street car transportation—but motor cars answered the purpose during the recent strike and the suspension of street car service. Employers and employees reached their work, plants operated as usual, retail trade averaged normal through the strike.

It has been estimated that motor cars carried about 70 per cent as many persons as the street cars would have carried. The 30 per cent deficiency includes the shoppers who stayed home, the street car pleasure-riders and the patrons of public and amusement parks.

$100,000 FOR MAIL TRUCKS

Washington, Aug. 18—The Senate has passed the Hardwick bill which appropriates $100,000 to the postoffice department for the purchase of a fleet of motor trucks to be used in experimental delivery work in large cities and their environs with a view to reducing the cost of foodstuff delivery. The bill is designed to reduce the cost of living and is expected to do much toward eliminating unnecessary expense and man power in delivery of food.

IDENTIFYING CARS BY PIECES

Detroit, Aug. 17—Could you identify your car if it were disassembled and the pieces came to your notice? That is how a stolen car was identified in Detroit recently. The identification of the parts led to the arrest and conviction of a man whom the police believe to be one of a band that has been stealing cars in large numbers in Detroit and selling them piece by piece or to dealers who sell used parts to car owners.

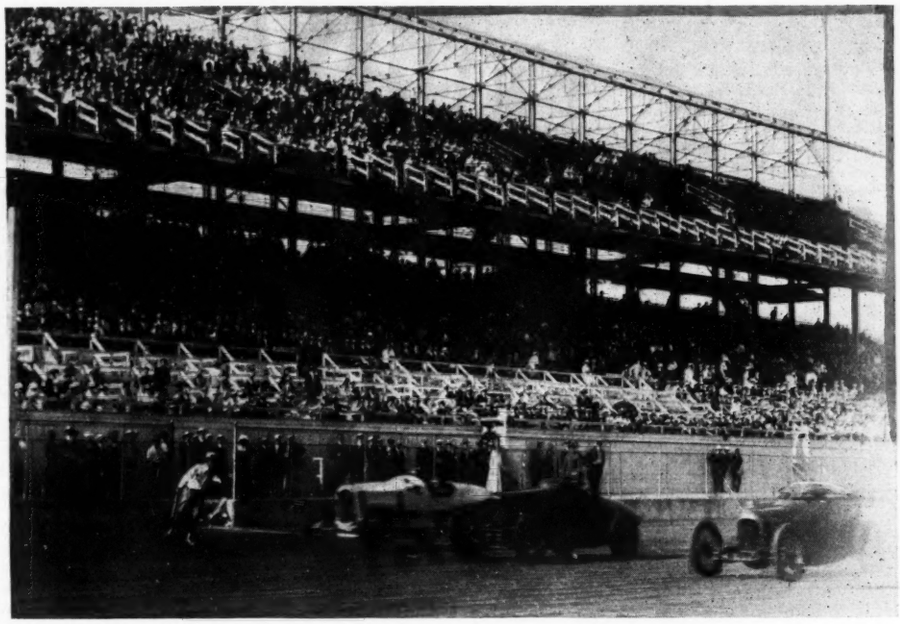
This car was stolen from in front of one of the large downtown office buildings while the owner spent less than 5 min. inside. The time indicated an organized system of stealing cars. No clue to the theft was found for several days, however. Then parts for cars of this make were advertised for sale, and the owner visited the store. He identified some of the parts to his car through distinctive marks he had placed on them, and a search of the place revealed the engine, body and other parts.

MAXWELL PLANS CHALMERS LEASE

Detroit, Aug. 18—The Maxwell Motor Co. is negotiating a lease of the plant of the Chalmers Motor Co. The lease, if carried out, is to interfere in no way with the production of Chalmers cars. The closing of the deal hinges on the obtaining of a contract for motor trucks from the Government.

De Palma Wins Triple Victory

Takes 20, 30 and 50-Mile Events



De Palma, Chevrolet and Oldfield in the getaway of one of the three events at Sheepshead Bap speedway Saturday

De Palma
Victor

NEW YORK, Aug. 18—De Palma and his speedy Packard were victorious in all three events at the Sheepshead Bay speedway, averaging close to 110 m.p.h. and defeating Louis Chevrolet and Barney Oldfield in a contest run in three heats of 20, 30 and 50 miles. In the 20-mile event de Palma averaged 110.1 m.p.h.; in the 30-mile, 108.5 m.p.h., and in the fifty, 108.9. In occasional spurts his speed rose as high as 114 m.p.h.

Louis Chevrolet in his Frontenac was second in the first two events finishing just a few feet behind the winner, but in the third contest loss of time due to tire trouble forced him to relinquish the lead to Oldfield. Barney was hopelessly outclassed in the 20 and 30-mile races; his Golden Egg was not up to its usual form. In the third race he switched to his Delage and took second because of Chevrolet's tire trouble.

De Palma's time for the three events was:

Distance	Time	Average per mile	M.P.H.
20	10:53.8	32.69	110.1
30	16:35.6	33.19	108.5
50	27:32.2	33.07	108.9

De Palma was usually in the lead, although occasionally he would lag behind Chevrolet 100 ft. or so, but from the way he drove it was evident that he had plenty of reserve power, while Chevrolet continually was running near the limit of his Frontenac.

De Palma won the 20-mile after a close duel with Chevrolet. The three cars made a preliminary lap and were running about 80 m.p.h. when they crossed the starting tape. The Packard and the Frontenac shot ahead leaving Oldfield gradually in the rear. In the backstretch Chevrolet forged ahead, increasing his lead to a 100 ft. as the two passed the grandstand. Soon de Palma began to gain and by the end of the next 2 miles the position of the two were reversed. From that point he was never headed and crossed the finish two lengths ahead of Louis Chevrolet with the Golden Egg a mile to the rear.

In the 30-mile de Palma jumped ahead of Chevrolet and held this advantage until the turn into the homestretch was reached, when Chevrolet passed him. The blue-black Frontenac led by a small margin until the next lap, when de Palma opened up and passed him. At 9 miles Chevrolet edged his car past the Packard and maintained a lead of about 20 ft. until the fifteenth mile when de Palma wrested first place from him and held it to the finish. There was wild excitement during the last mile, however, when Chevrolet, who had never been farther than two car lengths away slowly began to overhaul the flying Packard. As they drew near the finish it looked as though Chevrolet would pass, but de Palma managed to slide through a few feet to the good.

Barney Oldfield can add to his list of titles that of "gentleman driver." With silk shirt, gray trousers and jaunty cap, and a coupe racing car, all he needs is a liveried footman to lend the finishing touch

The 50-mile soon developed into a walkaway for de Palma because Chevrolet was forced to make two tire changes, once in the sixteenth mile and again in the forty-sixth. Barney Oldfield's Delage showed more speed than his racing coupe but it never threatened to climb into first place. The car had speed enough, however, to win second place since Chevrolet was handicapped by tire trouble.

Chevrolet's first tire change brought a roar of applause from the stands as he got away in the record time of 11 sec.

Arthur Chapelle of motorcycle fame, attempted to shatter the 2-mile track record of 1:25.2, but the best he could do was 1 sec. slower.

Miss Stinson was scheduled for an airplane flight but failed to appear. Instead Tex Monroe of the Staten Island flying school gave a 10-min. exhibition.

The Gate Receipts

New York, Aug. 20—The gate receipts at Sheepshead Bay Saturday amounted to $75,000, one of the largest gates ever collected at a motor car race in this section. By winning first prize Ralph de Palma, who won the 20, 30 and 50-mile heats, gets $15,000, while Barney Oldfield receives $7,500 and Louis Chevrolet, $2,500.

Use of Kerosene Still a Problem

Work Done to Make Tractors Operate on Low-Grade Fuel Aids Industry

WITH the present use of kerosene as a fuel for tractors admittedly still in the experimental stage so far as most tractor makers are concerned, the extent to which some carbureter makers are working toward a solution of this great factor in the use of tractors is shown conclusively in the paper presented before the meeting of the Society of Automotive Engineers, during the Fremont tractor demonstrations, by W. G. Clarke, chief engineer of the Wilcox Carbureter Co. In this paper Mr. Clarke sets forth what has been done to make tractors successful in operating on low-grade fuels, which he believes will advance the work of co-operation and standardization so vitally necessary to the tractor interests to-day. First he declares it is imperative that heat be applied to assist in vaporizing low grade fuels and that the problem lies in the determination of the best method of applying heat. He tells of his experiments in this respect and outlines the difficulties that arose in gas distribution, manifold condensation, pistons, spark plugs, etc., and tells how these difficulties have been overcome. His paper follows in part:

A Subject for Debate

The use of low grade fuels for tractor and truck motors has been for some time the subject of considerable debate and experiment. Of the mass of data now available on the subject there is much that is conflicting and erroneous, but enough careful work has been done so that certain fundamental principles, essential to efficient and satisfactory use of low grade fuels have been established and are more or less common knowledge. These essential principles and requirements are well defined and have been put before engineers and manufacturers many times, but it is a regrettable fact, that the short-sightedness of the majority of motor manufacturers and their reluctance to effect changes in design, which are so necessary in handling low grade fuels, have been chiefly responsible for the failure of most of the so-called kerosene tractors and have given kerosene and other low grade fuels their present ill reputation.

The object of this paper is again to set before the most interested what has been done and what must be done to make all our tractors successful in operating on low-grade fuels, and in this way to further the work of co-operation and standardization so vitally necessary in the tractor industry to-day.

The treatment of all low-grade fuels is essentially the same, but I wish to deal more specifically with kerosene, as it seems to offer the most logical solution of the present fuel problem.

All experiments with kerosene show conclusively that heat must be applied to assist in vaporizing the fuel, particularly for multiple cylinder motors so that the first step in the solution of the problem lies in the determination of the best method of applying the heat. There are four principal methods now in common use, i. e.:

1—Applying heat directly to liquid fuel before it leaves the nozzles, which will give maximum power and fair economy within limits, but lacks flexibility.

2—Exhaust jacketing of the intake manifold which heats the whole mixture. This entails a high volumetric loss but gives good economy and flexibility.

3—Preheating the air before it enters the carbureter, which produces a high volumetric loss and poor economy. This method does not apply the heat at the right time or in sufficient quantity with the result that a large part of the fuel either goes out the exhaust or into the crankcase.

4—A compromise of the two extremes, effected by exhaust jacketing a part of the carbureter above the bowl. In this method the fuel charge is heated to a high temperature with a small portion of the air, and after passing through the heat chamber is diluted and mixed with cold auxiliary air. This produces a mixture with all the advantages to a slightly modified degree of the other methods, with none of the disadvantages.

There are numerous combinations and modifications of these methods of applying heat, but they all can be classified under one of the four heads.

With the hope that perhaps it will save others unnecessary work, I will outline briefly a few of our own experiments in determining the best method of obtaining proper low-grade fuel mixtures.

Our first attempts to burn kerosene were made in 1911 on a 6½ by 8, four cylinder L-head motor. We first used an exhaust heated box containing a coil of pipe. The pipe was connected to a carbureter and to the engine manifold. The kerosene was drawn through the pipe coil with a small quantity of air and heated to a high temperature by the surrounding exhaust. After passing into the manifold the hot rich mixture was diluted and cooled with cold air and water vapor drawn from a second carbureter connected to the manifold beyond the heater. With this apparatus we lost too much power and had great trouble with pre-ignition and formation of carbon in the heater.

Experiments Made

We then tried forcing the mixture through with a portion of the exhaust to reduce resistance in the heater and to increase the temperature, but we still lost power and the pre-ignition was worse than ever. The pistons were then given more clearance and a stream of cold water turned on to the spark plugs which were in the valve caps, and the pre-ignition was materially reduced. Although the temperature got as high as 900 deg. Fahr. we did not crack the fuel. We proved this by interposing a radiator as a condenser between the heater and the manifold and were then able to condense the fuel back to raw kerosene. This apparatus was described in a paper presented by Mr. Bennett before the Metropolitan Section of the S. A. E. in March, 1913, and appears in the bulletins of that date.

The second apparatus was a slight modification of the first and was used on the silver medal winner of the Winnipeg Tractor Contest of 1911. It gave good economy and flexibility but lacked power and was quite cumbersome.

Fuel injection methods were next tried but were found to be too delicate on account of the small quantities of fuel used. Mechanical difficulties also involved so many complications that this method was abandoned as impracticable.

We also tried heating the air in an ordinary gasoline carbureter, but again lost too much power and encountered more pre-ignition and distribution trouble.

The next logical step was to heat the fuel, which we accomplished by exhaust jacketing the fuel bowl.

By deflecting a portion of the exhaust gases through this double bowl we could maintain the temperature of the liquid fuel at nearly the boiling point. To atomize the fuel we used a multiple jet standpipe with about seventy-five jets, which broke up the liquid into very fine particles. This gave a decided gain in horsepower, although the economy was practically the same as with the first

Perfex Radiator girls at Fremont tractor demonstrations—There was one at the exhibit of every tractor using Perfex

heater at full load. The light load economy and the flexibility was not so good.

We next worked to get better economy and flexibility by making various devices to break the fuel up finer. Some very successful ones were tried which bettered the economy greatly at full load, but they proved to us that light load economy and flexibility are dependent on high temperatures unless excessive gas velocities are maintained. To maintain a high gas velocity at low speed means wire drawing and volumetric loss at high speed, so we abandoned our mechanical vaporizers and went back to the heat problem.

These experiments had shown that we must use high temperatures for light loads and low speeds, and as little heat as possible at heavy loads and high speeds depending on velocity to prevent condensation at the higher speeds.

Present Type a Compromise

After numerous experiments with jacketed manifolds and various combinations of heated air and heated fuel, we evolved our present type of carbureter which is a compromise, embodying as far as possible the best features of our other designs and which will give the maximum of power consistent with flexibility and economy. In this carbureter we utilize the whole exhaust of the motor passing it around a heat chamber through which is carried the fuel with a small portion of air. The high temperature to which this primary mixture is subjected is lowered beyond the heat chamber by the admission of cold auxiliary air. To obtain the higher temperature necessary at light loads we employ a weighted valve in the carbureter controlled by the motor suction, which admits hot primary air at light loads, raising the mixture temperature when the exhaust gases contain the least heat. This valve closes under the increased suction of heavy loads and admits cold air to the heat chamber with the fuel, which together with the final dilution of the rich mixture with cold auxiliary air helps to offset the increased and unnecessary temperature of the exhaust at heavy loads. With this scheme we obtain the best heat conditions for kerosene, namely: hot air, hot mixture at light load, cold air, cooler mixture and high velocity at heavy load. Additional cooling is provided for by the admission of water when necessary by means of the same valve that regulates the primary air temperature, so that the entire heat control is practically automatic.

The foregoing deals merely with obtaining the mixture through the proper application of heat. We had innumerable difficulties with gas distribution, manifold condensation, pistons, spark plugs, etc., of which I wish particularly to speak to show that the kerosene carbureter does not exist so much by itself. The kerosene tractor, however, must include:

A An efficient vaporizing device to produce a homogeneous combustible mixture.

B A properly designed manifold to carry the mixture to the cylinders without condensation and with uniform distribution.

C A motor so designed as to take care of the higher operating temperatures of kerosene and capable of burning a kerosene charge efficiently.

The first two requisites have been more fully developed than the third and until the motor manufacturers and the accessory men get together and co-operate in producing a real kerosene motor, the kerosene tractor will remain as it is now, a makeshift at the best. There is no gainsaying the fact that the majority of so-called kerosene tractors are failures; and that the best of them are far from being as efficient and easy to operate as they should be.

Gasoline equipment will not handle kerosene satisfactorily nor will the installation of a kerosene device make a kerosene motor out of a gasoline motor, notwithstanding popular belief to the contrary.

The failure of the motor engineers and the carbureter men to get together in the past and co-operate in getting the best results in handling low-grade fuels is due to several things, chiefly:

First, the reluctance of most of the motor manufacturers to accept the results of outside experiment as affecting motor design.

Second, the high cost, lack of adequate facilities and time required for effective experimental work.

Third, stress of increased production demands, precluding radical changes.

The result has been that the carbureter men have assumed the whole burden and have been expected to produce an instrument which would make a kerosene burning motor out of the existing types of gasoline motor.

Two Classes

All of the kerosene tractors now on the market can be roughly divided into two classes; those that have made efforts to adapt their motor for kerosene work, and those that have simply attached one of the numerous kerosene devices. The latter class is by far the majority and it is largely to their failure as efficient kerosene tractors that is due the poor opinion of kerosene as a fuel. To illustrate how this class of machine will fall down, take the experience of a service man who was delivering a new tractor. It was one of those equipped with a heated air carbureter for kerosene and as is usually the case when these machines are running light, the mixture had to be kept pretty rich to keep the motor going. After traveling a few miles from town the lubricating oil got so diluted by raw kerosene working past the pistons, that two bearings burned out before the operator was aware of it, and this was on a new machine that had not even reached its point of delivery.

One of the first and most important things to consider in kerosene motor design is the clearance and cooling of the pistons. Due to the higher operating temperatures in kerosene work, the expansion and heating of the pistons is much greater than with gasoline, so that the clearance between the cylinder walls and the pistons must be greater to prevent seizing and scoring. Experiments with various types and sizes of pistons have shown that the body clearance should range from one, to one and a half thousandths per inch of diameter. The rest of the piston should be tapered towards the head with a clearance of four or five thousandths per inch of diameter at the extreme top. This is considerably more than automobile practice, but the tractor piston is subjected to high and sustained temperatures which the automobile piston never gets, and if clearances are not sufficient to take care of the additional expansion the pistons will seize and score the cylinder or at least cause heavy preignition.

Thick Piston Heads

Piston heads should be thick and well ribbed and filled to carry the heat away from the center of the head to the piston body, when it can be transmitted to the water jacketed cylinder walls. If this is not done the center of a piston will frequently get red hot and cause pre-ignition.

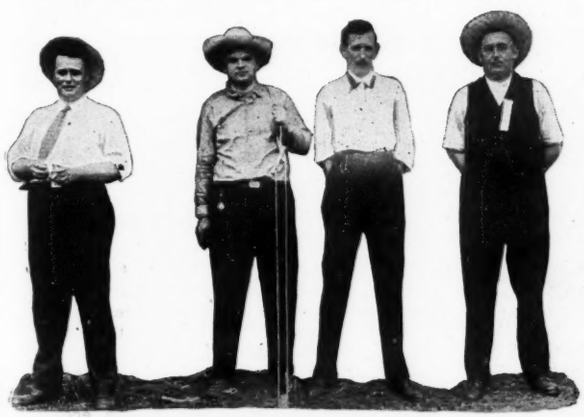
Ring gaps should be slightly greater in the kerosene motor to allow for expansion. Water jackets must be extra large and unobstructed and should be carried a trifle lower than is customary in gasoline designs so as to afford a free and uniform circulation of the cooling water and to help carry heat away from the body of the piston.

Valve seats, especially exhaust valve seats, should be well water jacketed, because a hot valve or valve cap will cause a lot of preignition trouble that is very hard to locate.

The form of the combustion chamber, efficient cooling of the valves, together with the fact that the intake passages have so few turns and pockets are what makes the valve-in-the-head motor so well adapted to low-grade fuels.

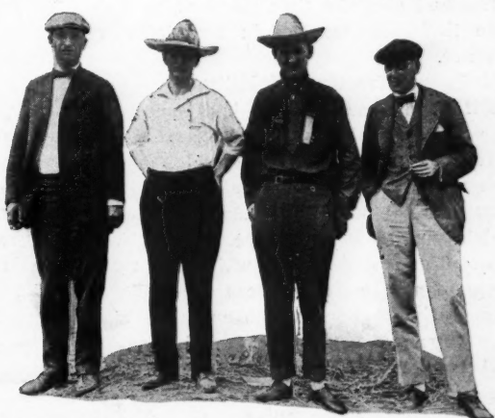
The compression is usually somewhat lower in kerosene work, although it is difficult to give any fixed rule for determining it. We have found that the best results are obtained by lowering the compression as far as possible without sacrificing power. In some motors it is possible to drop the compression 20 or 30 lbs. without losing in maximum power, although naturally the fuel economy and efficiency will not be so good. For good all around work the compression rarely exceeds 65 lbs., although it can sometimes be carried higher in an exceptionally well-cooled motor.

(To be concluded next week)



Kingston Carbureter people at Fremont—Left to right, Paul Burke, E. H. Geyer, P. A. Wiley, John P. Grace

C. W. Nash, president Nash Motors



McQuay Norris men—Left to right, L. A. Safford, Theo. Rowe, C. C. Pangman and H. W. Knapp

Fiat artillery tractor hauling big gun over a temporary wooden bridge across Isonzo river. To distribute load a long tow rope is employed

Tractors for Hauling Artillery

Allies Find Powerful Machines Advantageous for Quick Movement of Guns

In Two Parts—Part I

By W. F. Bradley

EDITOR'S NOTE—The War Department can take a lesson from what France has done to move its artillery quickly and effective. Mr. Bradley, Motor Age's special European war correspondent, tells in this two-part article how the French and Italian forces have solved the problem through close observation and found what is best for that purpose on the battlefield.

ARTILLERY haulage by means of gasoline tractors constitutes one of the most interesting branches of the motor vehicle service of the Allied armies operating on the western front of Europe. Although heavy guns are not exclusively hauled by gasoline tractors, the developments in this branch of the service are greater than in any other department, and sufficiently satisfactory results have been obtained to show that future applications must be in the direction of mechanical rather than animal traction. There are many reasons why the change should not be made at once, among them being the difficulty of getting new material in sufficient quantities and also the time required to train men to handle tractors in a satisfactory manner.

War Proves Tractor Suitability

Although some attention had been given to artillery haulage by mechanical means before August, 1914, it needed the war first to show that the horse was not necessary for this work, and secondly to prove which types of tractors were the most suitable. The period during which the right types of tractors have been available is comparatively short, which explains, in a very large measure, why animal haulage is still employed. Even among the Allies there is no uniformity in the type of tractor employed. The French always have shown a preference for the four-wheel drive tractor which they developed, and which is now produced in quantities by Panhard, Renault and Latil. These tractors are bigger and more powerful than those commonly used in America, and are always fitted with a winch, which is absolutely indispensable for artillery work.

The English, who had paid no attention to tractor haulage of guns before the war, and never built four-wheel-drivers, have fallen back on the continuous track drive—largely American—and also use the steam tractor to a considerable extent. The French claim that their four-wheel-drivers will do all that the English type can accomplish and will not destroy roads, for the French tractors are all rubber shod, which makes for less road distruction.

The Italians, again, have worked on entirely independent lines, and possess three different types of gasoline tractors, the Fiat, the Aratrice made by Pavesi & Tolotto, and the Soller. Unlike the French, rubber bandages are not employed for the driving wheels. The French and Italians are alike in finding no use for steam. The English have always had a weakness for steam, but even in their case greater progress has been made by gasoline. As an indication of the general tendency, the Italians, who hold the front presenting the greatest transport difficulties, make use of gasoline tractors exclusively in the hauling of their heavy guns. No matter what the height or the nature of the country over which they have to pass, the Italian big guns are advanced into Austrian territory behind the gasoline tractors built by the three firms mentioned above.

Meaning of Heavy Artillery

By heavy artillery is meant guns of 6-in. bore and upwards. Below this size gasoline tractors are used for hauling, but they are nowhere employed to the exclusion of horses. The French, for instance, carry numbers of their 75 mm. guns on special chassis, but the problem does not appear to have been tackled of applying mechanical traction to all the field batteries. Obviously the greatest advantage

is increased mobility when the guns are gasoline hauled, and it is for this reason that most of the 75 mm. anti-aircraft batteries are mounted on chassis. The Italians also have mounted many high-angle 75 mm. field pieces on chassis, built by Itala, for anti-aircraft service.

Italians Use Special Chassis

Although most of the Italian field pieces are horse-hauled, this army makes extensive use of a special chassis built by Spa for carrying and firing a special long range quick-fire 4-in. gun. This appears to be the biggest gun fired from a chassis, as distinct from guns which are hauled by a motor vehicle and fired from their own carriage. Not only is the gun motor-hauled, but the battery is served exclusively by motor. This means that not only the gun and its crews are carried by motor, but all the ammunition and supplies required by a battery are hauled without the use of horses. This is one of the finest examples of modern motor artillery to be found anywhere in Europe. Actual figures regarding the increase in the number of motor-hauled guns compared with horse-drawn cannon may not be available for publication until the end of the war. This fact, however, is certain that among the Allies as well as among the Central Powers the horse is giving way to the tractor all along the line and is liable to disappear, for everything but the haulage of the lighter field pieces. There is no divergence of view on this point, yet there is a great variety of opinion on the value of the respective types. Germany's conceptions are entirely different from those of the Allies, while among the Allies themselves natural characteristics are shown in the types of tractors adopted.

In planning the haulage of guns of 155, 280, and 305 mm., there are two general plans. Some armies consider it necessary for each gun to have its own tractor. When the gun is in position the tractor is idle and the men in charge of the tractor have nothing more to do than keep it in condition, ready for emergencies. Under this system the tractor is more often hidden under a tarpaulin and the branches of trees than doing work on the road, for even if the gun has several emplacements and changes its position at frequent intervals, so as to deceive the enemy, it cannot be engaged in hauling more than a fraction of its time. The advantage of this system is that the tractor is immediately available when the order is given to advance or retreat. For example, when the Germans withdrew from their positions on the Somme and the Aisne in March of this year, the system of a tractor for each gun was valuable, for it allowed the Allies to follow up with their heavy artillery without any delay.

Soller Single cylinder, double piston artillery tractor

Under the second system fleets of tractors are kept in partial independence of the batteries, performing all kinds of work, but ready to move the batteries to a designated position at an appointed time. There is a loose analogy with tugs and ocean-going steamers. The tug does not lie idle while the steamer is in dock or at sea, nor does the tractor go into retirement after placing a big gun in a position from which it may not have to be moved for a month or more.

The second plan is the more economical, but whether it is the more satisfactory will depend on the nature of the country and the kind of warfare being conducted. If a vigorous offensive is contemplated, there ought to be a tractor per gun. Acting on the defensive, or in a difficult mountain country, where rapid advance is impossible, the group system of tractors is quite satisfactory.

Fiat tractor hauling big gun hidden under branches of trees

The battery commander having received instructions to move from one set of emplacements to another, or to transfer to another section of the front, arrangements are made with the tractors to pick up the battery at an appointed time. In most cases the actual work of removal has to be done in darkness, for even if the roads are free from direct observation airplanes would naturally be interested in noting the general direction of the guns and if possible, locating their new positions. When the immediate vicinity of the front has been left behind and daylight haulage can be undertaken, it is a wise, if not elementary precaution to cover the vehicles with branches of trees, so that they cannot be distinguished at the height of 6000 to 9000 ft. at which most airplane observations are now carried out. It is obvious that a team of horses hauling 10-ton loads are very much more difficult to disguise than tractors.

Changing Gun Positions

A very common practice when a gun position has to be changed is to occupy two nights on the work. On the first night the various material connected with the battery is moved and on the second night the gun itself follows. In this way the gun can be in position and firing until within an hour of its removal and can be firing from another position a few hours later. It is but a detail in the art of keeping the enemy guessing.

A couple of guns of say 280 mm. bore, together with all their equipment, will require the services of twelve tractors, each one capable of hauling a maximum of 20 tons. In this case each tractor would haul two trailers, and counting an average length of 65 ft. for the three vehicles, the total length of the procession when on the move would not be much less than half a mile; even closed up as close as possible for

Four-wheel drive gasoline tractor for artillery haulage

a roadside halt, the length would be from 300 to 400 yds. Such a procession needs careful handling on the road both to avoid traffic congestion and to prevent it being spotted by whatever enemy airplanes may fly across the lines.

A single gun of 280 mm. bore, together with its special foundation will form a sufficient load for any single tractor. A gun of this size weighs approximately ten tons; allowing seven to eight tons for the second trailer carrying the gun platform, gives a total of about eighteen tons in tow, which is about as big a load as can conveniently be handled over give-and-take roads. One of the finest mechanical sights in connection with the war is the removal of two or three big guns, together with their crews and equipment. Take, for example, a couple of 280 mm. guns hauled by Fiat tractors. They arrive in some wrecked and deserted village behind the lines during the afternoon, and are immediately parked in an open space by the side of a ruined church. Each vehicle is partially hidden under branches of trees, but as soon as the convoy comes to a stop the crews go out and cut down more branches which form such a covering that even the most expert airplane observer would have difficulty in recognizing anything but foliage.

Work in Darkness

It is intended that this battery shall move up in support of the advancing infantry, but progress from this point is impossible until darkness has fallen. The convoy is therefore abandoned to the care of those men appointed for guard duty and the military police who happen to be on duty at that particular point. As soon as daylight has disappeared there is activity; a few orders are given, motors are cranked, a touring car containing officers moves away in the darkness, and within five minutes the first tractor has passed out of the square on to the dark roads. With no other noise than the rattle of chains and the crunching of wheels, the twelve tractors move away with their loads until in less than 20 min. the square is deserted of everything but numerous branches of trees and a motorcyclist whose duty it is to close the procession.

The first tractor in the big convoy has in tow one of the guns running on its own wheels and a special trailer carrying a wood and iron platform for the gun. The second tractor has in tow the fore-carriage of the gun and a trailer loaded with material. The third, fourth, fifth and sixth each have two trailers with all kinds of material or the battery crew. The seventh tractor hauls the second gun, while the following tractors have loads duplicating those in the first portion of the convoy.

On a good open road the average speed of this convoy is 7 m.p.h., the maximum being 9 m.p.h. At various points, however, the speed is cut down to 3 miles an hour or less. Many of the bridges, particularly those in captured territory, are only built for light loads. As the tractor itself weighs about eight tons, the gun ten, and the second trailer seven or eight tons, it will not be possible to get all three over at once. Thus, on the bridge being reached the tractor drops its load, crosses the bridge alone but unwinds its tow rope as it goes, then by means of its winch hauls first the gun and later the second trailer. Having picked up its load, it moves away and the second tractor goes through the same operation. If the bridge has been divided down the center to give separate tracks for in and out traffic, as is frequently the case, it is quite likely that other traffic will be stopped and both tracks will be made use of. Thus no sooner has a trailer got off the right hand side of the bridge than another enters the left-hand side, there never being more than one vehicle on the bridge at a time, but also no break in traffic. Probably this operation has to be carried out in darkness, or with very reduced lights, thus calling for very skilled handling on the part of officers and crew.

Teamwork in Placing Guns

As the guns reach the emplacement selected for them, more good team work has to be displayed. In all probability, the new position is within the vicinity of a made road, but it is never on or close by the side of a made road, nor must there be any tracks between the road and the actual gun position. Modern aerial photography has reached such a degree of perfection that it can often differentiate between a real and a sham road. In the final placing of the gun the winch with which all these tractors are fitted plays an important role. It is also desirable and necessary that the tractor should be able to advance over broken country so as to assist the crew in the placing of the gun.

All three tractors used by the Italian army were in existence before the war. While the war has not been responsible for their creation, it has had much to do with their development, for they have grown with the ever-increasing demand for more and more heavy artillery. Although entirely different types, the Fiat and the Aratrice appear to enjoy an equal degree of favor. The Soller, believed to be either a Swiss or a German invention, is an entirely different class and used in comparatively small numbers. This tractor has a single cylinder horizontal motor with double opposed pistons, the combustion chamber being between the two pistons. Although the engine is under a bonnet, there is no radiator, the cooling water being in a tank within the chassis. There are six speeds and reverse, the lowest speed

Fiat artillery tractor on Austrian territory

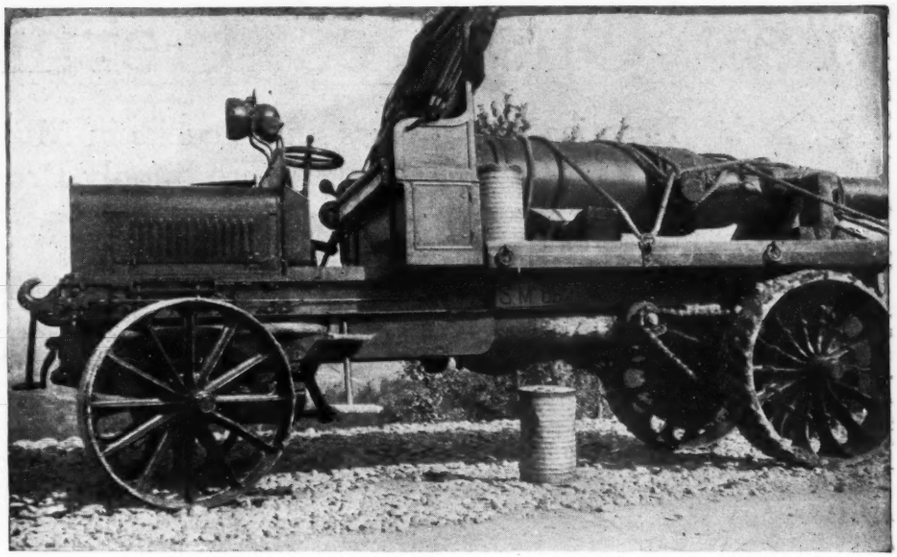
giving about 500 yds. an hour, and the highest 8 mi. Final drive is by side chains; both front and rear wheels are cast steel without rubber tires. Although used principally for hauling, this vehicle has a platform body capable of accommodating an 8-ton load.

The Fiat tractor, which was developed before the war with the primary object of hauling heavy artillery, has a 4-cylinder pair-cast engine of 5.1 by 7.8 in. bore and stroke. Except in the pair-casting of its cylinders its general design does not differ from the ordinary Fiat truck engine. A governor limits the engine speed to 1300 r.p.m. and the half-compression device automatically retards the ignition, which is by high-tension magneto with fixed advance when running. The transmission provides four speeds and reverse, with final drive by side chains contained in solid housings forming radius rods. At the rear of the chassis there is horizontal winch with a 15 mm. steel cable about 160 ft. in length. A powerful differential lock is fitted, and the brakes, which are all water-cooled, are so designed that the retarding force can be applied to one wheel independently of the other, this being for use on mountain roads with very sharp curves.

Cast Steel Wheels

The front wheels are cast steel with rubber bandages of 6.3 in. section. At the rear are 48-in. wheels of 7-in. face with herring-bone ribs to give greater adherence. The special feature of these tractors is the use of a segmental steel band placed around the wheel so as to increase the area in contact with the road and permit traveling in soft and broken ground. There is a very clever arrangement for carrying these bands, when not in use on the driving wheels, on the top of a special fender above the wheel. There are two small winches, one at each end of the fender, for hauling these bands in either direction when being put on or taken off the wheel.

There are two different types of these tractors, one having the engine under a hood, and the other under the driver's feet. This alters the platform dimensions, but chassis features are the same. The useful load carried on the platform is 5 to 6 tons; the unloaded weight of the tractor is nearly 7½ tons, and the maximum load it can haul over a level macadam road is 100 tons. In actual service, however, it is not often that the tractors are called upon to haul a load of more than 25 tons. When such a load is picked up, it is almost general practice to fit the driving bands, for the sides of the roads being soft it would be impossible to pull out without them. Men who handle these tractors speak in the highest terms of the work they can perform. This enthusiasm does not appear to be misplaced, for these tractors are working on all kinds of roads and country, at all levels, and never seem to have any difficulty in taking the guns to the positions selected by the artillery staff.



Italian big gun being moved from position for reboring aboard a Soller tractor

Although doing the same class of work as the Fiat, the Aratrice tractor for which the engineers, Pavesi & Tolotti, are responsible, is of an entirely different conception. It is a low-built tractor with 40-in. driving wheels, weighing only 5 tons complete, driven by a slow-speed, 4-cylinder engine of 5.1 by 7.08 in. bore and stroke. Smaller models are made, but this type is the most extensively used for artillery haulage. Until a short time ago these tractors were made with only two speeds, the lower one giving 1.8 m.p.h. and the higher 3.7. The latest model has a four-speed gearbox giving road speeds of 1.07, 2.4, 4.3 and 6.2 m.p.h. The rear wheel diameter has been increased to 47 in. and the platform designed to carry a 3-ton load.

The Fiat may be classed with the French four-wheel-drivers as an excellent tractor for artillery and other heavy haulage where roads exist. They are capable of working on very poor roads, and even on no roads at all; nevertheless their designers appeared to have in view the fact that nearly all their work would be done on made roads.

Italian Tractor Types

The Aratrice, on the other hand, could almost be classed with the continuous track drive, for it is a tractor which has been developed with agricultural conditions prominently in view; in other words, for doing most of its work on broken ground. The two have their respective spheres of usefulness. The Fiat type would haul guns over good roads at a higher speed than the Aratrice; this latter would take guns into positions that the Fiat type would have difficulty in approaching. It is almost entirely a question of deciding which set of conditions will predominate. If good roads are likely to be available all the time, a vehicle which cannot exceed either 4 or 6 m.p.h. will be at a disadvantage compared with one capable of hauling the same load at 8 m.p.h.

The Aratrice tractor has a centrally pivoted front axle, thus giving a three-point suspension of the entire vehicle. The driving wheels are a patented type, each one having twelve mobile steel shoes operated by an eccentric and connecting rods so that each shoe attacks the ground at the correct angle. On the purely agricultural machine, which undoubtedly will pass over any kind of ground that can be plowed, these ribbed shoes are replaced by a special type with projecting forked paddles.

(To be concluded)

Fiat artillery tractors on Italian front

War Changes German Design

Practically All Cars and Trucks in Military Service—Lack of Rubber Makes Tire Supply Problem Puzzling

By E. A. Langdon

MOTOR car design as now prevalent in Germany shows a considerable change during the last 30 months. Of course, in speaking of motor cars in Germany, one might as well say motor cars of the German army; there are few others left. The cars are made as light as possible without sacrificing too much strength; the wheelbase is elongated and the tread of cars built for months past standardized at railroad gage. Engines are preferably block cast with a lesser ratio than before the war, to save metal.

Tires—wherever they are used—are made of an "Ersatz"—substitute—as are so many things in the Germany of to-day, but a great many solid tires are used, suspension of the cars being so improved as to make up for the loss of elastic materials.

Many air-cooled engines are used, not so much for the reason of saving material—as there are radiators made entirely of aluminum, which metal is plentiful in Germany—as to eliminate trouble with the radiator unit. Engine and driver's seat are put as far in front as possible, so as to give a maximum capacity to the body. Carbureters are mostly automatic.

Steering Gear Given Attention

The part of the car which receives most attention in construction is the steering equipment. This is now made as strong as possible and of the best material which can be used. Army drivers say unanimously that there is now not one-fourth the trouble with steering gears compared to what occurred in the first year of the war, on a basis of mileage and average roadway.

The great importance of the motor branch of the transportation department of the German army has been emphasized again and again, and among the millions of soldiers in the service of the Central Powers there is not one, from private to field marshal, who denies its inestimable value. Officers who are experts in transportation assert that, while the work of Germany's motor vehicles has been less spectacular, it is no less important than was that of the unprecedented, powerful guns which, at the opening of the war, Germany put forward in the West, and later on used again for the leveling of Russian fortresses. It was on the eastern field, in fact, that the work of the motor vehicle was most conspicuous, for, while in France it forms only an adjunct to an elaborate and highly efficient railway system, the motor vehicle in the East assumed almost completely this rôle. All the eastern successes of the Germans, from the first rolling back of the Russians to Warsaw until the Roumanian campaign, were in a high degree due to the use of motor vehicles as a transportation means. It is significant that only where motor vehicles could play such a part, German campaigns could be developed according to traditional strategic principles and resolved themselves into trench warfare only after a certain position required by the German general staff was gained, such as the present line in Poland and Roumania, as well as the Macedonian front in the Balkan campaign of 1915.

The Roumanian campaign is in fact the most brilliant illustration of the possibilities of the motor vehicle in modern warfare. In a country the railroad system of which was planned—so far as it was at all of a strategic nature—against Russia rather than against Central Europe, the Germans had to fight an enemy on a front of more than 500 miles, a great deal of which is mountainous and well fortified in many places. When it is considered that at the time of Roumania's entrance into the war Austria-Hungary was utterly unprepared for the new enemy's action, so that the Roumanians in the first few days rushed into Transylvania with hardly any opposition at all, the system which could overcome such difficulties and turn them to advantage within less than a month must seem highly efficient.

The manner in which this was done is well known to-day. By applying a kind of vise, the jaws of which were formed by the respective armies of Falkenhayn in Transylvania and of Mackensen in Southern Roumania, the kingdom's army was forced to retire from the southwestern section which juts out between Bulgaria and Hungary past Bucharest to the east and north. This retreat could hardly be carried out with sufficient speed for the Roumanians, thousands of whom were captured daily for weeks, while they lost most of their equipment before they came to a standstill before Galatz. The German rate of progress, due to their motor equipment, was such that even what railways the Roumanians found at their disposal were utterly insufficient for the requirements of their retreat.

20,000 machines in Roumanian Drive

It is estimated that from 500,000 to 750,000 soldiers participated in the Roumanian drive while it was at its height. The number of motor vehicles employed can only be guessed at, but it is put by fairly well-informed sources at from 15,000 to 20,000. This would enable about 200,000 men to have moved at motor car speed, and, with their abundant equipment in field artillery and machine guns, to perform on a smaller but more effective scale the work of a "steam roller." Of course, the remainder of the armies were not without means for transportation, either; and by means of heavy motor vehicles as well as Rourmanian railways made efficient by improvised small-gage military railways they were able to follow and advance guard.

Another great advantage of motor car warfare, as this section of eastern fighting may be properly termed, is the exceedingly small number of casualties suffered by the armies having superior equipment. While in this instance, too, exact figures are not available, military observers place the rate of loss for the Germans at about one-third of what it was during the Serbian campaign. This is due not only to the fact that the Serbians are vastly braver than the Roumanians, and in spite of insufficient equipment put up a splendid fight, but because of the territorial advantage enjoyed by General Mackensen's army. Germans make no secret of this fact, and point to it as an indicator for the success of a rumored advance made later toward Odessa. This, however, the German general public hope will not be necessary, as they expect peace negotiations to begin about Jan. 1, 1918, and if they should fail to materialize or to bring results, look forward to a German drive in the west in the early spring, which, coupled with "thorough" sea warfare, they still hope will bring about the end of the war.

Carburetion Gives Trouble

The principal trouble motor vehicles have had for the last 1½ years lies in carburetion. Carbureters, and hence engines, do not work at their best under prevailing atmospheric conditions, which are abnormal, inasmuch as Europe had an unusual quantity of rain and snow in the months since last January. Nevertheless, the fuel economy of army motor vehicles is good, and, to the surprise of the management of this department, still improving. One astonishing fact is that the average army driver shows no tendency to drive, just to "deliver the goods" irrespective of the cost; but most of them do their utmost to minimize the consumption of fuel and oil by their machines in order to make the fatherland's resources go as far as possible. This shows to what a degree the marvelous military training influences the thinking of these soldier-drivers. The spirit of economy, by the way, is aided by a most efficient system of keeping track of the work and requirements of motor vehicles used by the armies of the Empire.

To return to the near-eastern campaign, the machines used—aside from those serving as carriers of ordnance—can be divided into three classes: Light trucks and passenger vehicles for the transportation of infantry troops; light and medium-weight trucks used for bringing up supplies of all kinds for these bodies of troops as they advance; heavy trucks representing a movable army base of supplies. It goes without saying that these groups are co-operating in the most intimate manner. Nevertheless, a machine cannot be detached from one branch of work and shifted to the other except by order of at least the head of the regimental motor vehicle department. If this strict system of responsibility does not result—and it does not—in a loss of efficiency and promptness, this is due to the most intimate contact between the motor and troop branches of the different army sections, whether it be a regi-

ment or a division or a corps. The system whereby this effect is attained is as thorough as can be imagined without degenerating into red tape. Of course, the execution of this system depends on the full realization of its essential features by each soldier attached to the motor branch.

One class of motor vehicle which is not heard of very much in general and which nevertheless renders highly important service is the tractor. There are several types in use, and it should be gratifying to Americans to learn that they have been designed along fundamentally American lines. There are three-wheel tractors of heavy capacity, as well as four-wheel creeper designs for both light and heavy work. The heavy tractors are used chiefly for the transportation of ordnance and large supply loads, especially over open fields; the lighter tractors supplement this work, but are also used extensively for agricultural work. For the German army works not only in a military way, but the troops behind the front serve in their spare time to increase the production of German soil. This has a threefold advantage: the peasant troops are able to utilize their time to best advantage at a kind of work which they love; other soldiers become acquainted with agricultural work carried out in efficient style, so that the country, when the war is over, will still possess millions of men adept in this work; all the ground held by the Central Powers is utilized as effectively as possible. Even to such a point, Germany is obliged to the motor vehicle; and the whole population realizes this, for whereas in the past millions of the country people held a slight—and sometimes more than a slight—distrust toward the motor vehicle the whole country now appreciates its value, and, if it is possible, loves the gasoline vehicle almost with as much feeling as was formerly entertained only for the horse. This illustrates in a strange way the degree to which the utilitarian and the sentimental are blended in the German mind.

Few Motor Vehicles Outside Army

Another mode in which the motor vehicle has shown its value is where it was conspicuous by absence. It has been stated that only the worst vehicles, and not many of them, are used in the interior of the Empire, except where trucks are needed for transporting products for the national household. The result is that where transportation is required for merchandise of other than military importance, the facilities are very poor. No one doubts that with a sufficient number of cars on hand this difficulty could be greatly alleviated; but this cannot be done, both because the army requires every good machine it can get, and because it is necessary for Germany to economize with fuel of every sort. For, with the ever-decreasing force of laborers, even the supply of coal is slowly falling off, while military and naval preparations call for ever-greater expenditures of energy in every form.

While this condition exists, and looking forward to a most active future after the war, Germany is preparing to prevent the recurrence of such difficulties if ever a similar situation should arise in Europe. Her eyes are turned, in this respect, chiefly toward Turkey. The Ottoman Empire is to be transformed not only into the Kornkammer—granary—of the Central Powers, but the production of industrial alcohol right there is planned on a most extensive scale. Already the colonial offices are designing plans on a large scale for the creation of this industry in Turkey, which will give employment to many thousands of German families and will raise the prosperity of the hitherto pauperized land of the Sultan. This will not only solve once and for all time the liquid fuel problem of the Empire, but will open up Turkey as a rich market for the products of European industry. Similar plans are under way for the best utilization of Austro-Hungarian and Balkan resources.

Military Influence on Design

All protestations of officials to the contrary, the spirit of preparation for future embroglios will hardly be abated in postbellum Germany; or, to say the least, the state will take an influential hand in the production of most important utensils. This will, without a doubt, include the manufacture of motor vehicles. Therefore, whether a state subsidiary goes with every car sold to a user, or not, motor cars will be built principally along lines which during the present war will have proved successful and useful from a military point of view; the combination of motor car makers will very likely have the constant aid of military advisers; and all possible efforts will be made to render the manufacture and operation of motor vehicles quite independent of resources beyond Germany's reach.

MAXWELL INCREASES WHEELBASE

Detroit, Aug. 18—Though the Maxwell Co. has not yet announced its line for the coming year, advance information indicates that mechanically the cars will be little changed. Chief of these changes will be an increase in the wheelbase from 103 in. to 109 in., permitting the use of a larger body. Several improved closed bodies will be incorporated, among which will be a sedan, a berline limousine and a coupe at $1,095 and a five-passenger touring car with an all-weather top selling for $855. The five-passenger touring car and the roadster will sell for $745. The wheels will be of the demountable artillery type, and an extra demountable wheel, carried on a special spare wheel carrier, will be provided.

JEFFERY NAME TO PASS

Kenosha, Wis., Aug. 18—With the announcement soon of the 1918 line of the Nash Motors Co. the name Jeffery as applied to motor cars will disappear and the name Nash will take its place. Ever since C. W. Nash took over the Jeffery plant it was apparent that the Jeffery name gradually would be eliminated as Mr. Nash completed his plans. For next season two cars will carry the Nash name. One will be the new Nash car, a brand new creation which to date has only been shown to the group of thirty Nash distributors that recently met at the factory to go over this new model. The car will be built in a variety of body styles and will sell at well under the $2,000 mark. There will be another Nash car which will be the 671 model Jeffery of this season carried on as a seven-passenger model but known as a Nash.

This will, of course, call for selection of materials, and, in fact, for a thorough revamping of motor vehicle building ideas, which engineers have not found sufficient time to undertake during the war. The internal combustion engine, ignition, power transmission, suspension and traction will very likely be changed, if not fundamentally, at any rate very materially. Engineers expect that within 5 years Germany will produce motor vehicles, both of passenger and commercial types, which will be radically different in appearance from the types now existing. Just in what direction this development is to go no one dares to foreshadow; but it is a foregone conclusion that even in the development of passenger cars utility will be the first, second and third consideration, before appearance.

One of the great problems still unsolved seems to be that of tires. As the war goes on tires grow fewer and fewer, and wooden wheels assisted by special suspensions take their places. This would seem to indicate that synthetic rubber is not as perfect a proposition as it seemed a year ago, and that a great deal of natural rubber was held in stock by the government to be used up by and by. It would only be surprising if the question of perfect rubber reclamation had not been solved more effectively than before the war. Very likely it is a discovery in this line which accounts for the long time Germany's stores of rubber have lasted in spite of the rigid exclusion of all rubber through the British blockade.

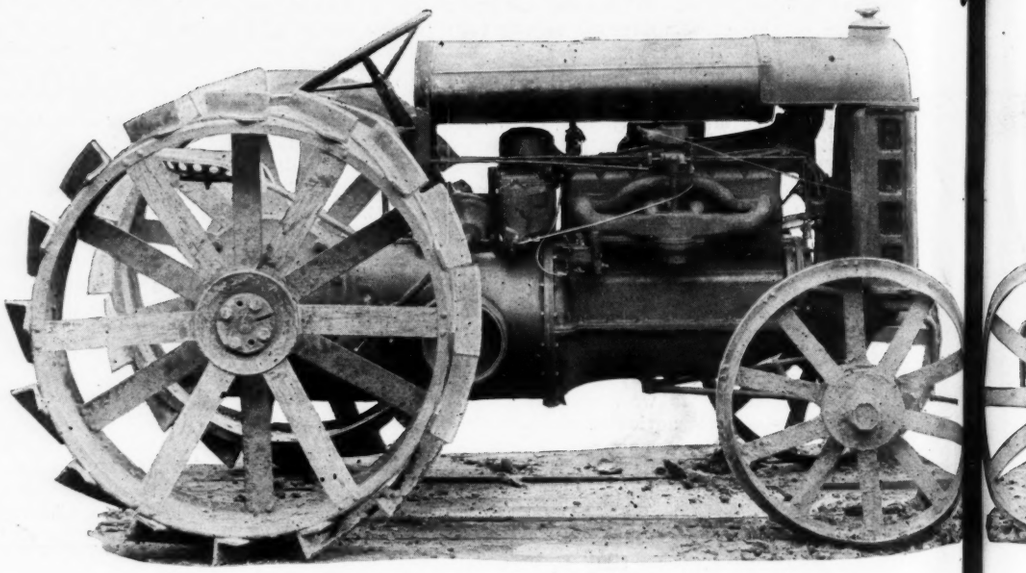
The metal question, so far as the motor vehicle is concerned, has not made very much headway in 18 or 20 months. Lightweight alloys have taken the place of steel and copper in many cases; and sometimes, as in the case of frames, even wood with steel-brace reinforcement has been used. Effective as these makeshifts might be, there is hardly a doubt, however, that they will disappear very soon after normal economic conditions are restored and Germany will once more have to compete with the world market. Steel will come into its own once more, almost completely; but it is quite possible that aluminum and its alloys will take the place of copper in many instances, excepting always the use of the latter metal as an electrical-current conductor. It is in this field that the copper shortage is most painfully felt by the Central Powers. An industrial activity becomes intensified to carry on the war, more and more electrical installations of every kind are required, and with the imports of copper almost nil, the metal must be taken from every form in which it is found at present.

Look to America

Finally, as to the motor car market here after the war, this subject has been taken up before, and all the remarks then laid down hold good now, and very likely will do so when the times of peace return. With Europe's resources growing weaker day by day, it is quite certain that America will be heavily called upon to help the work of reconstruction. Preparation should be made by motor car interests in America to take hold of the continental motor vehicle market as soon as communications are re-established.

Ford Tractor Ready

THE tractor built by Henry Ford and his son Edsel and which is now ready for production represents many original features in farm tractor engineering and gives an indication of what points of design the motor car industry may carry into the tractor field. Many of the principles Ford has championed in the motor car field are seen in the tractor, notably that of light weight, the tractor scaling at 2500 lb., whereas tractor weights with few exceptions average double that much. Design is largely responsible for this low weight in that many parts used in other tractors have

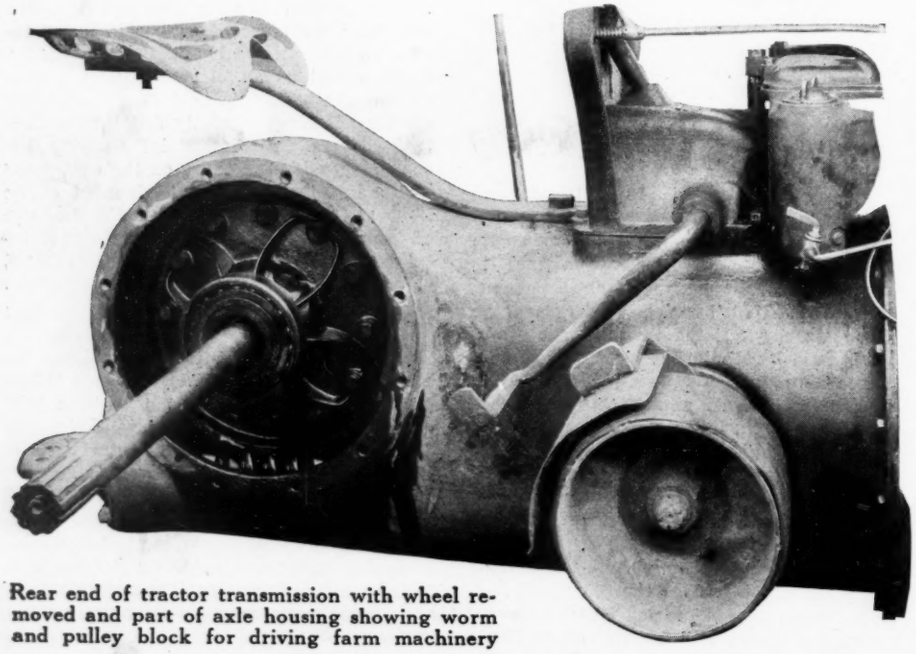


Right side of Ford tractor with the side panels removed, showing engine and powerplant attachments

been eliminated; thus there is no frame because the motor, gearbox and rear axle bolt one to the other, forming a bridge construction which takes the place of the frame. The radiator bolts to the engine so that necessary connecting pipes and tubing are eliminated; there is no water pump, there is no oil pump; then alloy steels are used through many parts, giving lighter constructions, and lastly the design in which relatively small driving wheels are used results in large weight reductions.

The rear wheels are but 42 in. in diameter and the front wheels 28 in. Many tractors have 60-in. and larger wheels. When it is remembered that a 60-in. tractor wheel may weigh 650 lb. and that the four wheels of such a tractor may weigh approximately 1700 lb., you gain some conception of what Ford gains by smaller wheels, when you recall that his entire machine weighs but 2500 lb.

The present Ford machine is a development of the one demonstrated at the Fremont, Neb., plowing demonstrations a year ago, when it was first exhibited and demonstrated to the public. Since that time little has been heard of it, but it is known that changes have been made, and unquestionably the experience with the tractor in Europe has hastened alterations. Several



Rear end of tractor transmission with wheel removed and part of axle housing showing worm and pulley block for driving farm machinery

EDITOR'S NOTE: This is the first complete description of the new Ford tractor and is exclusive to Motor Age and its allied publications. Motor Age is indebted to the courtesy of Henry Ford and his chief tractor engineer, Charles E. Sorrenson, for their co-operation in securing complete details of the tractor for the first time.

By J. Edward Schipper

thousand of the first produced will be absorbed by the British government.

In a word the Ford is a four-wheel machine, driving through the two rear wheels and steering through the front ones. It uses a four-cylinder engine, a multiple-disk clutch, a three-speed and reverse gearset, a worm-driven rear axle and is particularly conspicuous in the tractor field in that everything is inclosed, which is much at variance with much tractor design to-day. Nothing is more necessary than having all parts well inclosed in a tractor in that the machine is very often working in a constant cloud of dust. It starts on gasoline and burns kerosene.

At present no price is announced, but from the construction it is seen that the machine will not be an abnormally low-priced job. That expense is not spared is shown by the very general use of the finest annular ball bearings as well as alloy steels. The aim of Henry Ford has been to build a good serviceable machine, a handy type as well, in that it can turn in a circle with a radius of 21 ft., and works with a draw-bar pull of 1500 lb. This makes it a two-plow machine for working on intermediate speed of 2.7 m.p.h. It is claimed to have a 25 per cent reserve power when working at this standard. The machine has a high speed of 2.83 m.p.h.

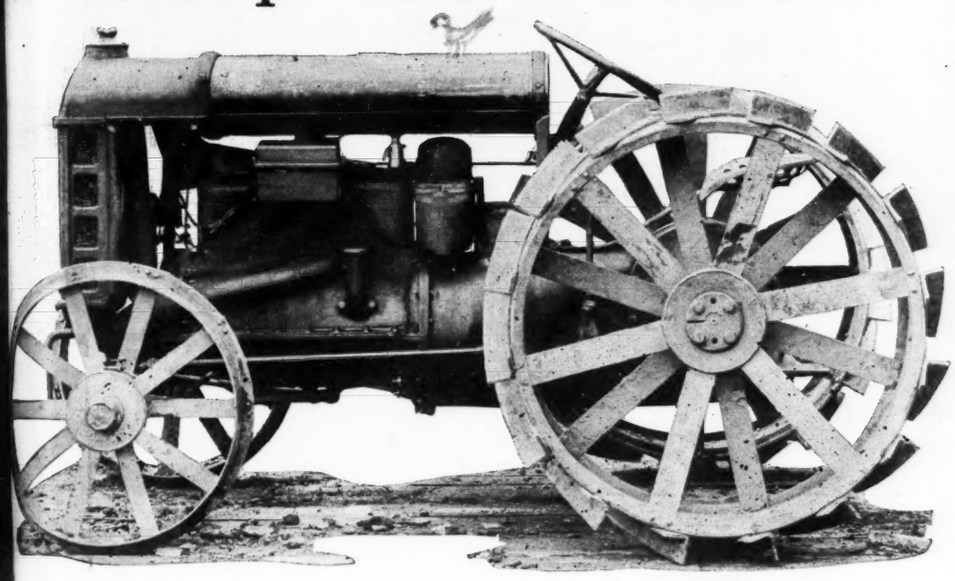
Ten years ago Henry Ford conceived the idea that a light farm tractor selling within reach of the average farmer would prove to be one of the greatest boons to the country. At the same time he had two other ideas, one that an economical sawmill would also be a great boon, and the other that a low priced motor car incorporating good materials and the elements of reliability would make a great manufacturing success.

Many Experiments Made

Fate decreed that he should make the motor car and the success which he has achieved with it is well known. But during the years that Henry Ford had been making cars and millions, the idea of the tractor has never left him. Three years ago he started accurate experimenting on ideas which he had taken up from time to time during the previous years, and the results of these experiments in the engineering laboratory and on the farm are just about ready to enter the final stage of production.

The machine is best described as a unit construction. The powerplant, transmis-

Help the Farmer



sion and rear axle housings are bolted together so as to form one bridge, which acts as the backbone of the machine. This unit is mounted flexibly to the front axle, giving a three-point suspension, so that the stresses imparted by irregularity of the ground do not have to be borne by the metal structure.

Special heat treatments have been worked out to give the best physical characteristic for definite purposes, and throughout the following description the combination of steel and dimensions should be noted to see how lightness, with sufficient strength, has been one of the underlying principles determining the features of design.

Practically the entire body of the Ford tractor is made up of two unit castings, one embodying the crankcase and the other the clutch, transmission gear and worm wheel. These two castings are bolted together and form the basic structure of the entire tractor unit. It is the use of these two simple but strong castings which has made it possible to dispense with the frame construction.

Clearance of 11 In.

The hard ground road clearance of the tractor is 11 in., the lowest point of the tractor being the flywheel housing. On medium ground, where the vertical flange of the front wheel will sink into the surface, the clearance is 10 in.

The four-cylinder engine 4 by 5 in. L-head block, has a displacement of 251.3 cu. in., is capable of delivering, according to dynomometer tests at the plant of Henry Ford & Son, 22 hp. at 1000 r.p.m. This is with kerosene and at a compression of 60 lb. absolute or 45 lb. gage. The working torque of the engine is 15,000 lb. and the machine throughout has been designed with this torque in view and with factors of safety, which correspond with the amounts and natures of the stresses resisted by the different parts.

The engine block is cast from semi-steel —in other words from iron refined by the addition of about 15 per cent of steel scrap. The crankcase is also of cast iron and so are the pistons. Three crankshaft bearings have interchangeable caps, this being one of the features of the machine, and helping in its production advantages. It also is a factor in the maintenance of the tractor.

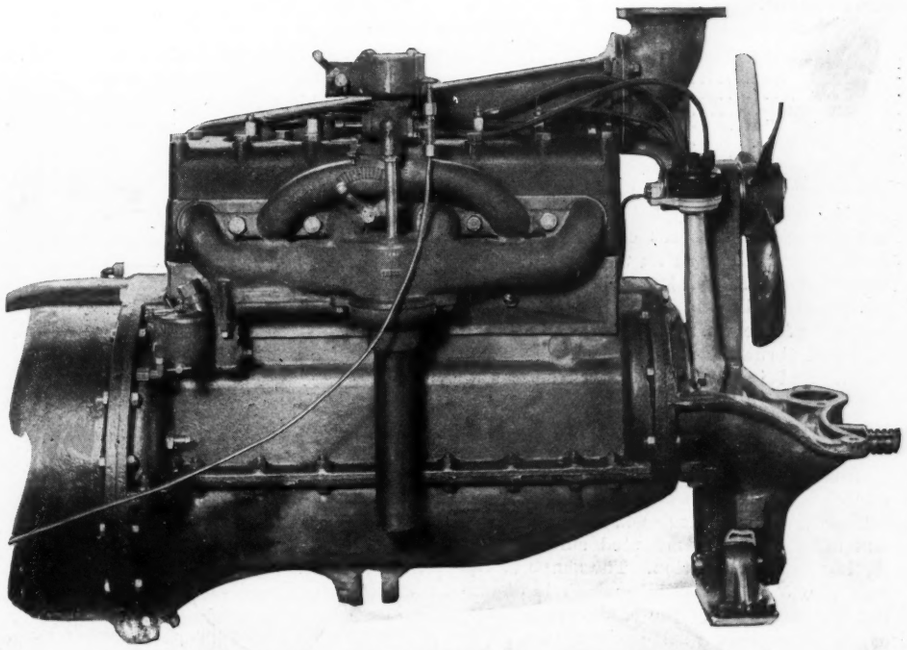
A steel gear carried on the end of the crankshaft, in combination with a cast-iron gear into which it meshes, forms the entire timing set. These gears have a helical cut. The cams operate directly on mushroom tappets. No adjustment is provided between the push rod and the valve stem, the poppet valves being operated directly. The valves have a clear diameter of 1½ in. and a lift of $\frac{5}{16}$ in.

The fuel supply is in an overhead 22.5-gal. kerosene tank carried by supports above the engine. Starting is by gasoline, and for this purpose a tank holding about 1 qt. is provided. The vaporizing system consists of a single-bowl carbureter in connection with the vaporizing manifold, in which the intake passes through a coil surrounded by the exhaust gases. All the air passes through an air-washing device filled with water. The primary air first is mixed with the kerosene, and, after being vaporized in the coil, the secondary air completing the supply necessary for combustion enters at a point above the vaporizing coil. A distinctive device is the use of a damper on the manifold to regulate the amount of heat brought into contact with the coil.

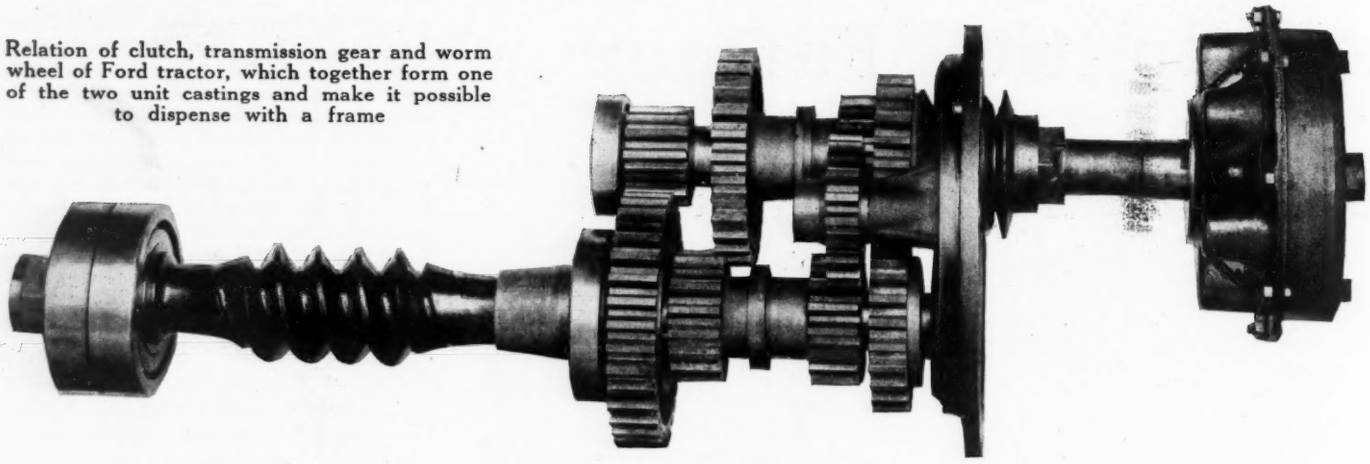
Left side of Ford tractor with the side panels removed, showing the oil filler, air wash and coil box

Probably one of the most important problems which have been worked out on this tractor is that of cooling. In line with the policy to keep this tractor as simple as possible there is neither water nor oil pump. For cooling the thermo-syphon system is used, in which 11 gal. of water circulate through the jackets and radiator. There are certain distinctive features of this thermo-syphon system which are important. First, the waterjackets extend the entire length of the cylinder to the point where it reaches the crankcase flange. No rubber hose connection is used between the radiator and engine. They are bolted together. Another point is the elimination of all restricted passages and the care with which the water is led into the detachable head to eliminate steam pockets. The water outlet in the radiator has an area approximately equivalent to that of a 3-in. pipe. Cooling is aided by a four-blade fan having a diameter of 17 in. and run on ball bearings.

Ignition is by flywheel magneto. There are ten magnets clamped to the flywheel rotating behind the stationary fields. The current output from the magneto varies in



Right side of Ford tractor engine, showing the vaporizing manifold with damper control for heat



Relation of clutch, transmission gear and worm wheel of Ford tractor, which together form one of the two unit castings and make it possible to dispense with a frame

accordance with the speed of the engine from 6 to 14 volts, giving a hotter spark at higher speeds, being close to 14 volts at 1000 r.p.m., and it is carried to a single high-tension coil. The breaker mechanism is incorporated with the distributer and driven by a vertical distributer shaft.

Oiling is by constant-level splash with the flywheel magnets used as a distributer. The oil caught up by these magnets is thrown into a scoop at the end of an oil pipe which leads directly to the front of the crankcase. From here it overflows to a trough beneath each of the four connecting rods. The beating of the connecting rod spoons into these troughs of oil throws up a spray which lubricates the interior of the engine, including the main bearings and timing gear. No attention need be given the oil system except to see that it is supplied with lubricant. The capacity of the system is 2½ gal.

Final Reductions

From the engine the drive is transmitted to a multiple disk clutch running in oil. By means of the reductions in the three-speed gearbox and worm, which has a ratio of 17.5 to 1, the following final reductions are obtained.

Gear	Ratio	M.P.H. at 1000 r.p.m. of crankshaft
High	18.25-1	6.83
Low	85 -1	1.34
Reverse	48 -1	2.60
Plow (intermediate)	46 -1	2.70

All the gears and shafts of the gearset are chrome vanadium steel, and the shafts are carried on Gurney ball bearings having both radial and thrust components. The final drive is through an underneath worm which is a straight type, 60-deg., double-thread worm having a 1.2 pitch. The end support of the worm shaft is a duplex radial and thrust Gurney bearing. The material used in the worm is chrome-vanadium steel and the worm wheel is of aluminum bronze.

The differential is a four-pinion type transmitting an equalized drive to the semi-floating axle.

The driving wheels are 42 in. in diameter and upon them are mounted suitable projecting lugs for traction. The shape of the lugs is one of the details which is engaging the attention of the engineers at present in order that a self-cleaning lug angle may be evolved. The front wheels are builtup T-section in which the spoke is riveted between two angle irons placed back to back, with the flange projecting outward to give a grip on the soil and steering. The diameter of the wheel proper is 28 in., but the total diameter is 30 in., due to the 1-in. projection of the T all around. The front axle is an I-beam forging in place of the three-piece built-up section formerly employed. The wheels are carried on radial and thrust ball bearings. Steering is through a fore-and-aft sector and pinion of a motor car type.

One of the points which has been in mind in laying out this tractor is the fact that the farmer of little mechanical experience will be required to take care of it. Everything can be reached with the least possible effort. Take one example: The crankcase can be dropped while the tractor is standing on its wheels and the only part which need be removed is the radius rod. The tractor is able to turn in a radius of 21 ft. and can work steadily with a 1500-lb. drawbar or two-plow load on the plow or, intermediate gear, having 25 per cent reserve power besides.

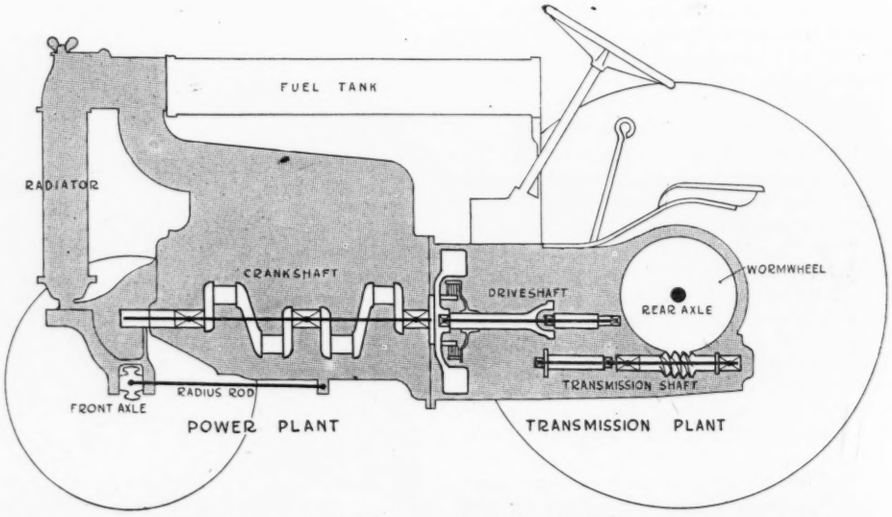
METZ ANNOUNCES UNIT LINE

Waltham, Mass., Aug. 19—A radical departure from the Metz line was announced at a convention of dealers assembled at the Metz factory when President Charles H. Metz told of the company's intention to go into the truck unit manufacture extensively with vehicles of from 1 to 4 tons capacity. He said his plans were to solve the used car problems of the motor dealers by making units for all cars. The cost of a used car equipped with a unit would be within the reach of many, he figured, and dealers can handle the units or not as they see fit.

The entire day was spent at the Metz plant, and from the arrival of the dealers early in the morning until the vaudeville entertainment in the evening the time was fully occupied. First there was an inspection of the plant. Then there was a luncheon served by the Metz Girls' Club with produce from the farm worked by employees, the cooking being done on the premises by young women from different departments.

Units Are Displayed

In the afternoon a display of the units was staged on the field adjoining the main factory. One was the Metz chain-drive, 1-ton unit made of heavy pressed channel steel. Another was a Metz internal-gear drive unit; a third was a 2-ton or more universal truck attachment; a fourth, the Metz front end power unit and the other a Metz Convertractor. The fact that the Metz had added an internal gear transmission and chain drive to its friction drive powerplants interested the dealers. Production has started already and orders are on the books for units.



Skeleton drawing of Ford tractor with the different parts lettered

More Flyers for Uncle Sam

WILMINGTON, Del., Aug. 10—To aid the government schools, courses in flying are being given to students in a school established by Pierre S. duPont, Irene duPont and John J. Raskob at Claymont, Del. The school is maintained by them at their own expense and is known as the Claymont Aviation School.

Harry N. Atwood, an aviator, was placed in charge. He is assisted by Thomas Birt, formerly a lieutenant in the Royal Flying Corps, who has trained aviators in England, France and Canada.

The first class has ten pupils and all but one of them—Allen O. Smith of Mount Vernon, N. Y., who lost his life in a hydroplane accident on July 21—are finishing their course of eight weeks, which will entitle them to diplomas.

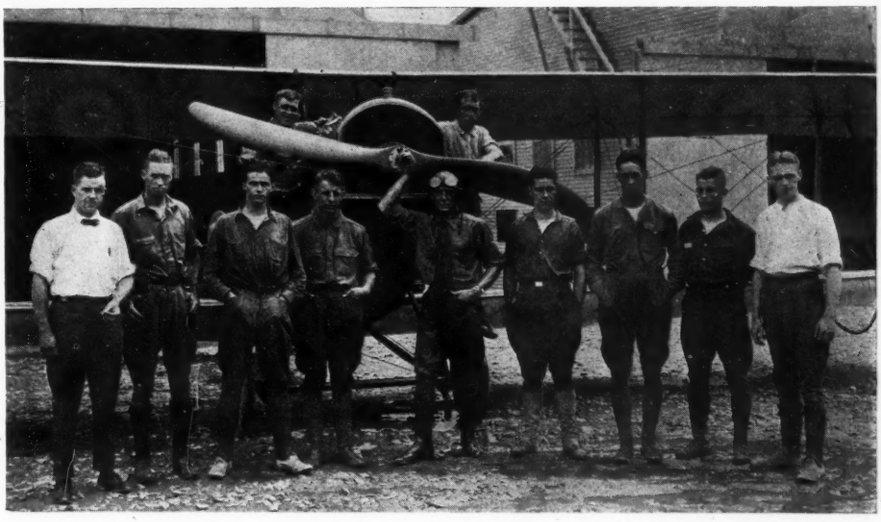
The men are ready for service as soon as they are graduated. Each is under obligation to enter the United States aviation forces after passing the final tests. The period of training is two months. Their living and sleeping quarters comprise big barracks, which are built of frame and contain two bunk rooms, equipped with iron beds of the camp variety, and a large mess hall. Tobacco must not be used in and around the machines and hangars, and the students pledge themselves to shun intoxicants both on and off the field. Four o'clock in the morning sees the camp awake and getting ready; then comes breakfast and by 4:30, if the weather permits, the machines are in the air. This is because the early morning atmosphere is best suited to flying.

There are four machines at the school, two Curtiss tractors, a Thomas flying boat and a Thomas tractor. The Curtiss machines carry two men, the instructor and pupil, and it is the aim of Atwood and Birt to have each man go up twice in the morning and twice in the late afternoon. No flying is done in the middle of the day, the camp suspending operations at 8.30, resuming at 4.30 and flying until dusk. During this off period, the men are learning the mechanism of the machines.

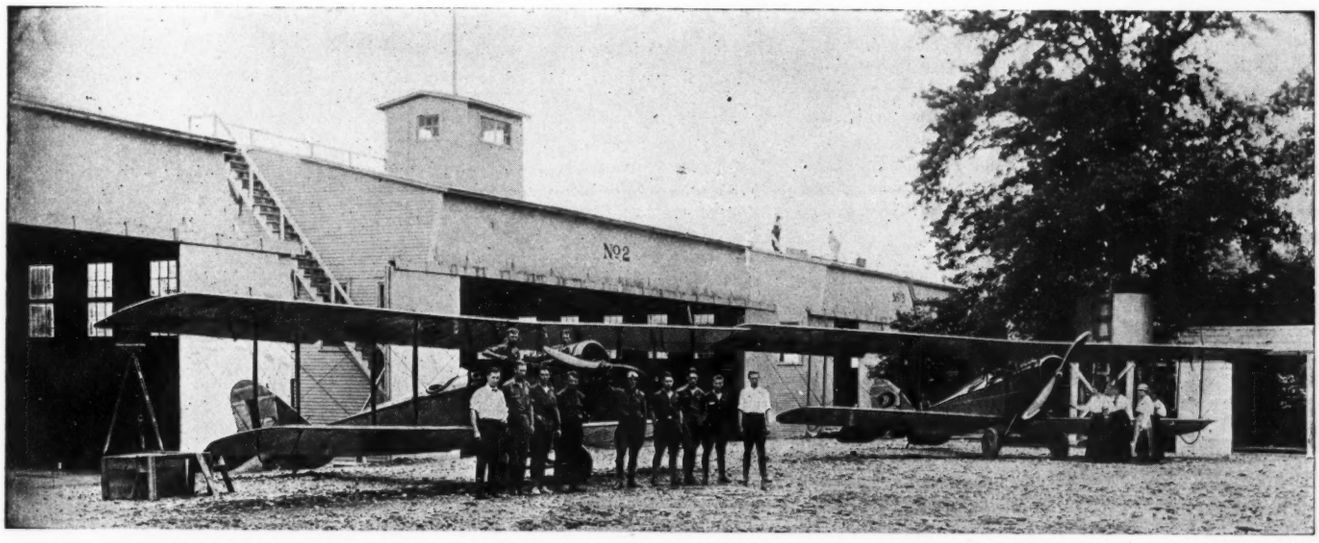
At the end of the two-months training period the students are expected to be proficient in piloting, to know their work in airplanes and hydroplanes, to know some-

(*Concluded on page* 31)

One of the Curtiss tractors used at the Claymont aviation school in Delaware



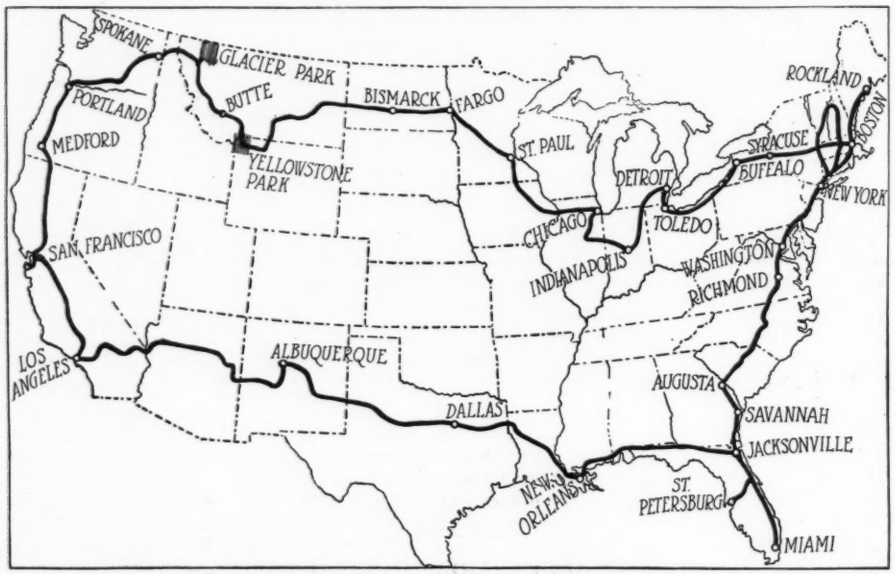
Group of students at new aviation school established by the du Ponts and Raskob on the Delaware river. Birt, instructor, stands with his hand on the propeller hub



The larger of the two airplanes belongs to Thomas Birt, formerly lieutenant in the Royal Flying Corps, now at the Claymont aviation school. The smaller plane is used by the students. The school has three aircraft in all

Circum-motoring the U. S.

18,000-Mile Junket Trip Entirely Around Rim of United States Takes Almost Year to Complete



Route followed in motor trip made by Portland girl around the border of the United States

AND now, if the honored statisticians please, let's enroll upon the motor car records of the country the name of Miss Ruby L. Archambeau, who has just returned to her home in Portland, Ore., after driving her Marmon car every inch of an 18,000-mile junket trip entirely around the rim of the United States, touching thirty-five states of the Union.

This Portland girl, the daughter of W. L. Archambeau, who was educated at the old Portland Academy before going East to complete her studies, is without doubt the first woman, if, in fact, not the first person, to loop the borders of her country by motor, and the beauty of the record is that Miss Archambeau guided and managed her car for the complete distance without the intervention of relief drivers, usual to transcontinental drives.

Started Last Year

Starting from Portland July 22 of last year Miss Archambeau was accompanied by Mrs. M. G. Stevens and Robert Hitch of Portland on the cross-continent trip to New York, via the Glacier and Yellowstone National Parks, Minneapolis, St. Paul, Chicago, Indianapolis, Detroit, Buffalo and Boston. After driving through the famous White Mountains country and as far north as Rockland, Me., Miss Archambeau, with only Miss Leah J. Buckingham of Milford, Conn., as her companion, drove south from New York through Washing, D. C., to the famous beach resorts of Florida and as far as Miami. Miss Archambeau and Miss Buckingham spent four months of the winter season at Daytona, Palm Beach, Tampa, Ormond Beach and other resorts.

Early in the spring, still motoring by themselves, the two drove west to New Orleans, via Georgia and Alabama, completing a trip of between 4000 and 5000 miles on which they were unaccompanied. At New Orleans they were joined by Miss Buckingham's sister and brother, Mr. and Mrs. M. P. Tibbals, also of Milford, Conn., who rode west with them through Dallas, Tex., and over the Santa Fe trail as far as San Francisco before returning home. In San Francisco they were joined by Miss Abbie W. Oliphant.

On the entire trip of some eleven months, embracing approximately 18,000 miles of motor travel, Miss Archambeau says she found no roads worse than the highways of Louisiana, where some of the roadways were virtually impassable. In one place it took her 3 hr. to cover 10 miles; at another place they had to tarry a whole day to allow the roads to dry out following a rain; and Louisiana also furnished the only spot from which they had to be pulled out. Along the levees for about 200 miles out of New Orleans the roadway was barely wide enough for the car in many places. Between Florida and Louisiana Miss Archambeau experienced the doubtful pleasures of riding some 50 miles on ferries of one rank and another. As a general thing Miss Archambeau reports that the roads along the northern border of the country were superior to those through the southern tier of state, but she grants that she made the northern trip at a more favorable season of the year.

Despite the fact that the highway builders of Florida have had deep sand to contend with the roads of that state are splendid, Miss Archambeau says. The highways are now paved almost the full length of the state, running north and south, with the prospect that the cross-state road running east and west also will be paved next year. The Portland girl did fight with 2 ft. of sand along some of the roads of Florida, but she utterly forgot all the bad things she ever thought about sand when she was allowed to turn her trusty Marmon loose at a gait of 60 m.p.h. on the famous Ormond Beach speedway along the coast of Florida.

In making her trip through thirty-five states, in addition to the District of Columbia and a taste of Canada, Miss Archambeau was arrested six or seven times, she does not remember how many, but each time she escaped entirely without punishment.

Miss Archambeau averaged about 150 miles of travel each day spent on the road, though on many occasions she drove more than 200 miles. Only once did she have to send for help on the road and then she was delayed but 2 hr. She and her companions managed at all times to patch up tire troubles without loss of temper and to take care of the car during all its flights of disposition. Not once did the party camp out, Miss Archambeau always being able to reach some city or town of hotel proportions. As for the expenses of the trip the venturesome Portland girl merely says they were quite enough and there the matter is to stand so far as the public is concerned.

Route Information

Texarkana, Ark.-El Reno, Okla.

Texarkana, Ark.—Editor MOTOR AGE—What is the best route, and what are the conditions of the roads between this city and El Reno?—Harry Firmin.

From Texarkana drive to New Boston, Tex., DeKalb, Oak Grove, Annona, Clarksville, Detroit, Blossom, Paris, Brookston, Petty, Honey Grove, Bonham, Whitewright, Vandalia, Anna, Van Alstyne, Howe, Sherman, Denison, Colbert, Okla., Calera, Durant, Milburn, Tishomingo, Drake, Millcreek, Sulphur, West Sulphur, Davis, Wynnewood, Pauls Valley, Maysville, Purcell, Lexington, Noble, Norman, Moore, Oklahoma City, Packingtown, Yukon, El Reno.

The roads you encounter are all of natural dirt and their condition depends upon local weather conditions. We would not advise this trip right after heavy rain.

Vol. 7 of the Automobile Blue Books published at 910 South Michigan avenue, Chicago, contains complete running directions.

New Castle, Pa.-Columbus, Ohio

New Castle, Pa.—Give a direct route over good roads from here to Columbus, Ohio.—Hugh H. Chambers.

We suggest the following: New Castle, Mahoningtown, Moravia, Newport, Wampum, Homewood, Beaver Falls, Rochester, Freedom, Economy, Ambridge, Sewickley, Haysville, Glenfield, Avalon, Bellevue, Allegheny, Pittsburgh, Carnegie, Bridgeville, Canonsburg, Houston, Washington, Pa., Wheeling, W. Va., Bridgeport, Hendrysburg, Elizabethtown, Cambridge, Zanesville, Mt. Sterling, Hopewell, Gratiot, Brownsville, Linnville, Jacksontown, Newark, Granville, to Columbus.

Vols. 3 and 4 of the Automobile Blue Books published at 910 South Michigan avenue, Chicago, contain complete running directions.

New Castle, Pa.-Richmond, Va.

New Castle, Pa.—Editor MOTOR AGE—Give a route from here to Richmond, Va.—Hugh H. Chambers.

Go to Pittsburgh, Wilkinsburg, East Pittsburgh, East McKeesport, Jacksonville, Irwin, Adamsburg, Grapeville, Greensburg, Ligonier, Stoyestown, Katner, Schellburg, Wolfsburg, Bedford, Everett, Breezewood, Harrisonville, McConnellsburg, Fort Loudon, St. Thomas, Chambersburg, Fayetteville, Cashtown, McKnightstown, Gettysburg, Peach Orchard, Lewistown, Harmony Grove, Frederick, New Emmitsburg, Mount St. Marys, Thurmont, Market, Ridgeville, Damascus, Cedar Grove, Gaithersburg, Westmore, Rockville, Bethesda, Washington, D. C., Alexandria, Va., Accotink, Yorton, Occoquam, Dumfries, Garrisonville, Mountain View, Falmouth, Fredericksburg, Spotsylvania, Snell, Partlow, Chilesburg, Mantico Station, Coatesville, Ashland to Richmond, Va.

Vol. 3 of the Automobile Blue Books published at 910 South Michigan avenue, Chicago, contains complete running directions.

Sioux City, Iowa-Chicago

Sioux City, Iowa—Editor MOTOR AGE—Give a route from here to Chicago returning by way of Omaha.—O. E. Adams.

EDITOR'S NOTE

MOTOR AGE outlines route itineraries for its readers by letter. Each week only a few of the routes asked for are published, these being those of more general interest. In asking MOTOR AGE for routes write your name and address distinctly on a return envelope.

From Sioux City go to Holly Springs, Smithland, Mapleton, Charter Oak, Denison, Vail, Westside, Carroll, Glidden, Scranton, Jefferson, Grand Junction, Ogden, Boone, Ames, Nevada, Lamoille, Marshalltown, Legrand, Montour, Tama, Gladstone, Chelsea, Belle Plaine, Cedar Rapids, Marion, Mount Vernon, Lisbon, Mechanicsville, Clarence, Lowden, Wheatland, Grandmound, Dewitt, Clinton, Lyons, Fulton, Morrison, Sterling, Dixon, Ashton, Rochelle, Creston, DeKalb, Geneva, West Chicago, North Glen Ellyn, Maywood, to Chicago.

From Chicago retrace the trip as far as Sterling, then proceed to Galt, Lyndon, Erie, Hillsdale, Watertown, Moline, Davenport, Durant, Wilton Junction, Moscow, Atalissa, West Liberty, Iowa City, Coralville, Oxford, South Amana, Marengo, Victor, Brooklyn, Kellogg, Newton, Des Moines, VanMeter, Stuart, Adair, Atlantic, Oakland, Council Bluffs, Omaha, Missouri Valley, River Sioux, Onawa, Whiting, Sloan, Salix, to Sioux City.

Vol. 5 of the Automobile Blue Books published at 910 South Michigan avenue, Chicago, contains complete running directions on the above trip.

Tip for Tourists to New Hampshire

CONCORD, N. H., Aug. 18—Motorists who plan to visit the various shore resorts and the White Mountains of New Hampshire had better obey the motor law this year or they will find themselves in trouble, writes a MOTOR AGE correspondent. Olin H. Chase, the motor vehicle commissioner, after giving some thought to the violations of the speed laws on the state highways decided to put into operation a motor vehicle squad. So he has equipped six men with fast machines, and they are placed two on each of the three trunk highways. They do not wear any uniform, and may not be singled out from any other motorcyclist. All they have to identify them are badges that they wear under their coats. The men have roving commissions, and they may go anywhere on the highways in their territory. They trail along and note how the cars are being driven and sometimes issue a warning to those who may seem to be trying to keep within the law but are going a little too fast. Those who dash along around the bad curves at too high speed are summoned into court.

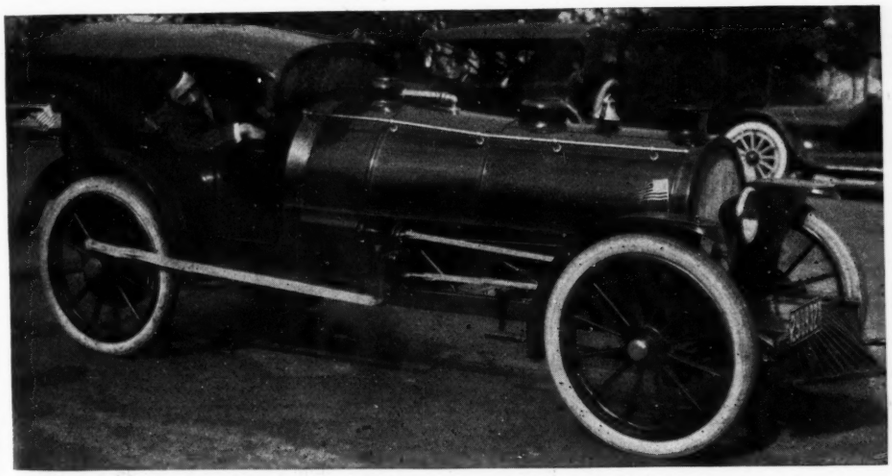
The men have been instructed not to make any discrimination between visitors from other states and New Hampshire motorists, but to treat all alike.

MAY REQUISITION ROAD CREWS

Washington, D. C., Aug. 17—The Wisconsin state council of defense has approved a plan whereby county road crews may be requisitioned for haying and threshing and other rush work on farms where a serious labor shortage exists. The county councils of defense will decide when such requisition is necessary. The plan has been approved by the Council of National Defense. The Wisconsin council has taken the matter up with the highway commission, with an arrangement whereby road labor could be free for farm work at certain times without harm to road construction in view.

BUDA TO ADD TO CAPITAL

Chicago, Aug. 21—The Buda Co., Harvey, Ill., has authorized a tax-exempt issue of accumulated preferred stock in the amount of $1,000,000 which will yield 7.3 per cent net, the purpose of which is to provide additional working capital commensurate with increasing business. In addition to this new capital, holders of common stock have purchased 3000 shares of common stock at par, which gives the company an additional capital of $300,000. The earnings of the Buda Co. have increased steadily for several years, amounting to over six times the annual preferred dividends in 1916, and the current earnings for the last six months are at the rate of more than ten times the preferred dividends. Dividends on common stock have been paid consistently.



A. F. Sternad, designing engineer, worked odd moments for four years and at a cost of $10,000 built this toy, capable of 60 m.p.h The car contains more than 500 lbs. aluminum and uses a Rutenber engine

MORE FLYERS FOR U. S.

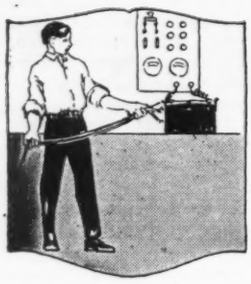
(*Concluded from page* 29)

thing of offensive and defensive maneuvres, map plotting, gun range work and scouting. Twice a week lectures are given. The lectures must be supplemented by reading, the whole being finished off by the practical work. The actual flying of the men is at altitudes ranging from 500 to 1000 ft. at first, and later extending to greater heights. Among the subjects in which the men are instructed are principles of flight, construction, design and operation of aviation engines; meteorology, pressure and circulation of atmosphere, local flying, cross-country flying, selection of air routes, opportunity for aeronautical exploitation, research work, laboratory installation, invention and martial necessities and possibilities. The mechanics on the field are R. B. Hopkins and James Rothwell.

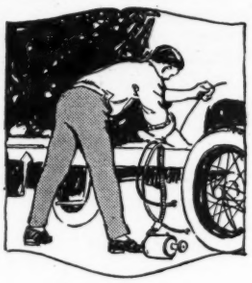
Military Rules

Accommodation has been provided at the student camp for twenty-five men, and each is required to live under military rules. The aviation field and the hangars are guarded. Students are not permitted to take relatives or friends to the field without special permits from the authorities.

The purpose of the school is to turn out a class of trained aviators every two months, and with the aquisition of more machines, for which orders have been placed, it is believed that the school will become an important feeder to the air squadrons of the government.



Electrical Equipment of the Motor Car



By David Penn Moreton & Darwin S. Hatch.

Editor's Note—Herewith is presented the fifty-seventh installment of a weekly series of articles begun in MOTOR AGE *issue of June 29, 1916, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the U. P. C. Book Co., Inc., New York, in a size to fit the pocket conveniently.*

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems, and the relations of current pressure and resistance were brought out. This was followed by an explanation of series and multiple circuits, how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was considered. A section was devoted to the makeup and action of lead and Edison storage batteries, and another to the care of lead batteries in service and the best methods of charging them. Magnets and electromagnetism then were considered, and the principles of generators and motors explained. A section on generator output was followed by one on the purpose and operation of the cutout. Electric motors and engine and motor connections then were considered.

Part LVII Magneto Drive and Mounting

THE value of the electrical pressure produced in the secondary winding is limited by the distance between the spark plug points and the degree of compression in the engine cylinder. If these points are not in circuit, as previously explained, due to a broken or loose secondary wire, or if they are loose or apart, a very high voltage will be induced in the secondary winding. The possibility of such a destructive high-tension voltage being generated in the secondary winding is prevented by connecting across the terminals of the secondary winding an auxiliary gap, as shown in Figs. 312 and 313. The gap between the two terminals Z1 and Z2 is longer than the gap between the terminals of the spark plug and ordinarily no spark will pass between these terminals, but should one of the secondary circuits from the distributor be opened accidentally, the electrical pressure in the secondary winding will build up to a value just sufficient to jump the safety gap and no higher.

The V-shaped piece is so arranged that it may be turned through a small angle relative to the permanent magnets. The object of this is to obtain the same intensity of spark for all positions of the spark. Thus when the breaker is rotated by the spark lever in advancing or retarding the spark, the coil and piece of wire on which it is wound is rotated on the same turn and exactly the same amount so that the same magnetic conditions are maintained.

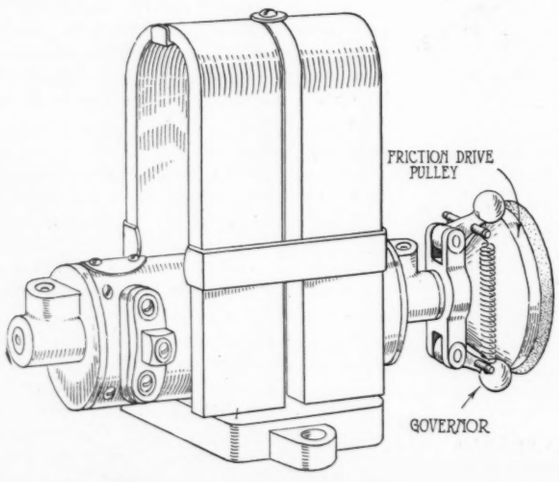


Fig. 315—Friction-drive magneto with governor

Friction Drive Magneto

The very early forms of magnetos were driven by a small friction wheel mounted on the end of the magneto shaft, and the magneto was so arranged and mounted that this wheel rested against the surface of some revolving portion of the engine, usually the flywheel. In these cases it was not necessary that there be any definite relation between the speed of the engine and the speed of the magneto. The principal difficulty was the dangers resulting from excessive speeds, and this was overcome by combin-

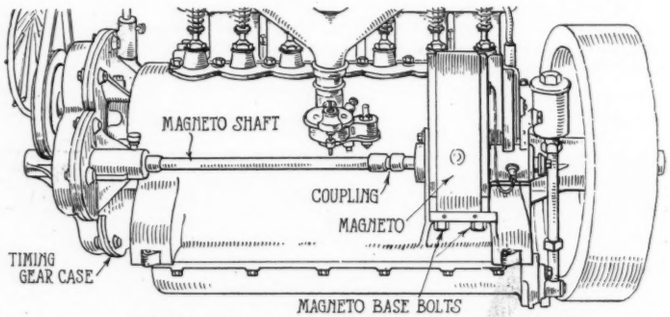


Fig. 316—Magneto driven from timing gears

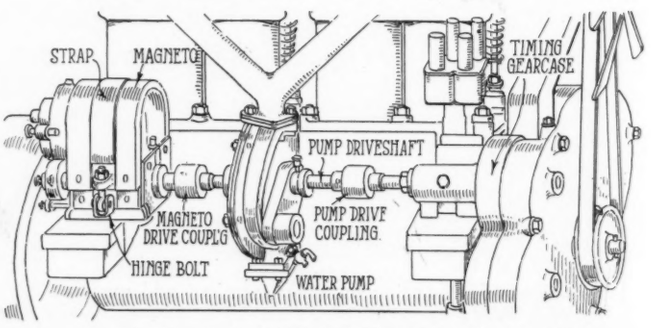


Fig. 317—Magneto driven by extension of pump shaft

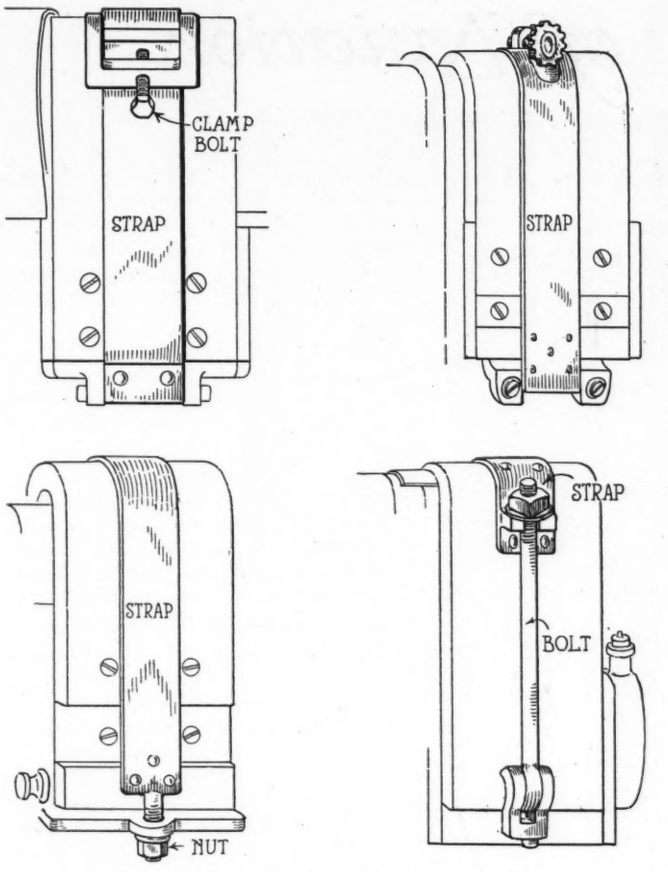


Fig. 318—Typical methods of holding magnetos in place

ing a governor with the friction wheel in such a way that the driving action ceased when the speed of the magneto armature exceeded a predetermined maximum for which the governor had been adjusted. A magneto fitted with a friction drive and governor is shown in Fig. 315. A belt sometimes is used in driving a magneto but in no case where the speed of the magneto and engine must bear a definite relation to each other.

Gear and Chain-Drive Magnetos

In all cases when it is necessary that the speed of the magneto armature bear a definite relation to the speed of the engine shaft, it is necessary to make use of either the chain or gear methods of driving. Gear drive is used more than the chain drive, and the gears usually are made an integral part of the engine, or the same gears that are used in driving the pump or camshaft may be used in driving the magneto. Two typical methods of mounting and driving a magneto by gears are shown in Figs. 316 and 317. It is customary to mount the magneto on a bracket which is a part of the engine base or to provide a suitable mounting by bolting a bracket to the engine base. Several methods of fastening the magneto in position are shown in Fig. 318. It always is best when possible to place the magneto on the inlet side of the engine and as far away from the exhaust pipe as possible, because the excess heat is likely to seriously injure the insulation. A flexible coupling usually is provided between the magneto and driving shaft to take care of any slight improper alignment of the two with respect to each other.

When the magneto is driven by a chain, some means must be employed to keep the chain tight to keep the armature of the magneto and the engine shaft always in their proper relation to each other.

Impulse Starters

The impulse starter is a special form of coupling which operates, in brief, as follows: The armature of the magneto is connected to the driving shaft by a spring, and in starting the magneto armature is prevented from rotating, which results in the connecting spring being compressed or wound up as the driving shaft rotates. After the driving shaft has revolved a certain angular distance, the armature of the magneto is released, and it jumps forward under the influence of the spring until it is caught again and the cycle of operations repeated. During the rapid movement of the armature, the magnetic lines of force will be cut at a high rate, which will result in a high electrical pressure being produced in the armature winding. By properly connecting the magneto gears to the engine, this high electrical pressure may be produced just at the instant that a spark is desired in one of the cylinders.

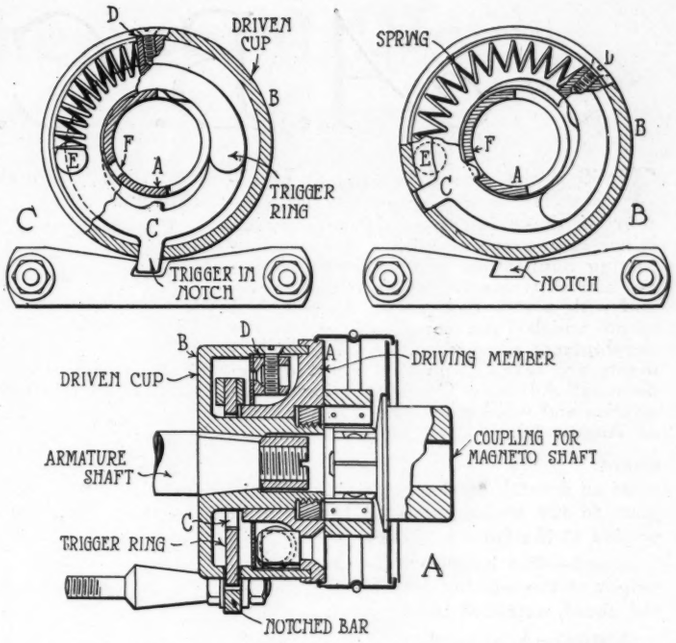


Fig. 319—Eisemann impulse starter, consisting of a notched member and a driving member

The operation of a device of this kind as made by the Eisemann company may be explained by reference to the three cuts shown in Fig. 319. The coupling consists of two parts, a tube, A, which is the driving member, and an inclosing cup, B, which is the driven member, the two being connected by a spring. There is a loose ring, C, within the cup, which is known as the trigger, and it has a lip which extends through a slot cut in the periphery of the cup. Mounted directly beneath the coupling is a notched bar, which is so placed that the notch is in line with the slot in the cup so that the trigger drops down under the action of gravity and holds the cup from rotating. This condition is shown in the ring, C, Fig. 319. On the outside of the trigger ring there is a cam which engages a corresponding cam cut in the driving tube. After the lip on the trigger has become engaged with the notch in the notched bar, as shown in C, the tube A continues to rotate and causes the spring, which is held between a driving pin, E, attached to the tube A and a block fixed to the cup B to be compressed. At a predetermined point, the cam on the trigger ring engages the cam on the tube A and lifts the trigger high enough for the lip to disengage the notched bar, and the compression of the spring spins the cup around at a momentarily high speed in a clockwise direction. This momentary high speed gives a very hot spark and may be equivalent in intensity to one obtained under ordinary conditions at an engine speed of several hundred revolutions per minute.

At slow speeds the cup is caught again and again as the driving member of the coupling causes it to rotate, but when the speed has attained a certain value, the trigger ring by its own weight becomes a ring governor and the centrifugal force keeps the lip from dropping down the slot in the tube B. A small lug on the inside of the trigger ring in line with the lip and on the same side engages a notch in the tube A and thus provides a positive drive so long as the speed is maintained.

A. B. C. of Aviation

THIS is the second installment of nomenclature given for the information of those interested in aeronautics. It has been prepared with a view to eliminating duplication of terms, the erroneous use of terms and confusion of terms, and with a view to defining the principal terms which have come into use in the development of aeronautics. The installments are taken from the report of the National Advisory Committee for Aeronautics and will be completed in the issue of August 30.

Chord

Of an aerofoil section—A right line tangent to the under curve of the aerofoil section at the front and rear.

Length—The length of the chord is the length of the aerofoil section projected on the chord, extended if necessary.

Controls—A general term applying to the means provided for operating the devices used to control speed, direction of flight and attitude of an aircraft.

Critical angle—See Angle, Critical.

Décalage—An increase in the angular setting of the chord of an upper wing of a biplane with reference to the chord of the lower wing.

Developed area of a propeller—A layout of the area of a propeller blade designed to represent the total area of the driving face, in which the elements of area are developed as if unfolded onto the plane of the drawing, necessarily an approximation on definite assumptions, as no true development of the helix can be made.

Dirigible—A form of balloon, the outer envelope of which is of elongated form, provided with a propelling system, car, rudders and stabilizing surfaces.

Nonrigid—A dirigible whose form is maintained by the pressure of the contained gas assisted by the car-suspension system.

Rigid—A dirigible whose form is maintained by a rigid structure contained within the envelope.

Semirigid—A dirigible whose form is maintained by means of its attachment to an exterior girder construction containing the car.

Disk area of a propeller—The total area of the disk swept by the propeller tips.

Diving rudder—See elevator.

Dope—A general term applied to the material used in treating the cloth surface of airplane members to increase strength, produce tautness, and act as a filler to maintain air-tightness; usually of the cellulose type.

Drag—The total resistance to motion through the air of an aircraft, i. e., the sum of the drift and head resistance.

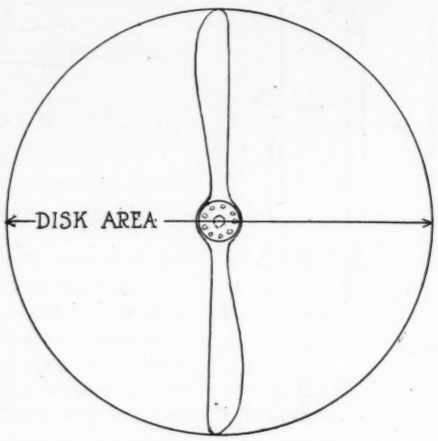
Drift—The component of the resultant wind pressure on an aerofoil or wing surface parallel to the air stream attacking the surface.

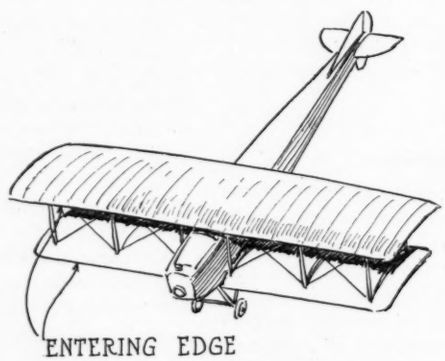
Elevator—A hinged surface for controlling the longitudinal attitude of an air craft, i. e., its rotation about the athwartship axis.

Engine, right or left hand—The distinction between a right-hand and a left-hand engine depends on the rotation of the output shaft, whether this shaft rotates in the same direction as the crank or not. A right-hand engine is one in which, when viewed from the output shaft end, the shaft is seen to rotate anticlockwise.

Entering edge—The foremost part of an aerofoil.

Fins—Small planes on aircraft to promote stability; for example, vertical tail fins, horizontal tail fins, skid fins, etc.





Flight path—The path of the center of gravity of an aircraft with reference to the air.

Float—That portion of the landing gear of an aircraft which provides buoyancy when it is resting on the surface of the water.

Fuselage—See body.

Gap—The distance between the projections on the vertical axis of the entering edges of an upper and lower wing of a biplane.

Glide—To fly without power.

Glider—A form of aircraft similar to an airplane but without any powerplant. When utilized in variable winds it makes use of the soaring principles of flight and is sometimes called a soaring machine.

Gliding angle—See Angle, Gliding.

Guy—A rope, chain, wire or rod attached to an object to guide or steady it, such as guys to wing, tail or landing gear.

Head resistance—The total resistance to motion through the air of all parts of an aircraft not a part of the main lifting surface, sometimes termed parasite resistance.

Helicopter—A form of aircraft whose support in the air is derived from the vertical thrust of large propellers.

Inclinometer—An instrument for measuring the angle made by any axis of an aircraft with the horizontal.

Keel plane area—The total effective area of an aircraft which acts to prevent skidding or side-slipping.

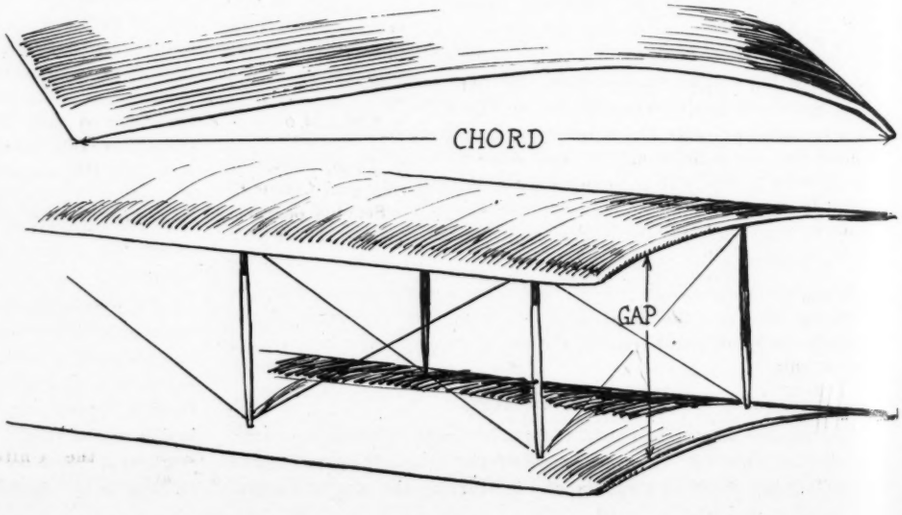
Kite—A form of aircraft without other propelling means than the towline pull, whose support is derived from the force of the wind moving past its surface.

Kite balloon—See Balloon, kite.

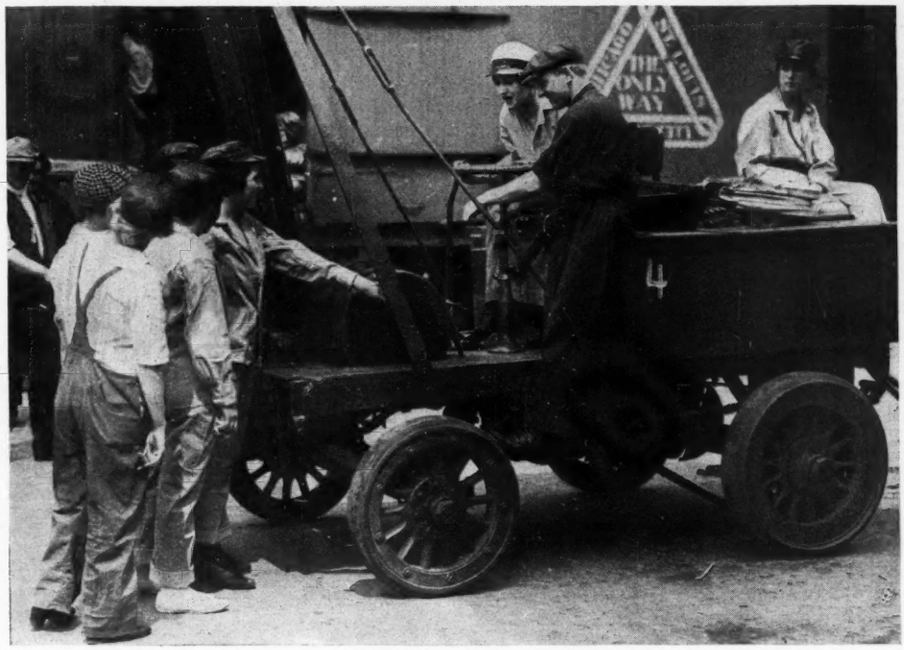
Landing gear—The under structure of an aircraft designed to carry the load when resting on, or running on, the surface of the land or water.

Lateral stability—See Stability, lateral.

Leading edge—See Entering edge.



Women and the World War



WOMEN are coming into prominence as drivers of motor trucks now that men are leaving for mobilization camps or foreign fields. New York already has its corps of women motor drivers, and Chicago has organizations of women who are ready to drive.

A Chicago bus firm is advertising for 1800 women as chauffeurs of its cars since the draft was made. Rockford, Ill., is a prospective field for women drivers, as are the other cantonment locations. So many of the regular chauffeurs are employed in driving cars and trucks between the camps and the business sections that none is left for the ordinary delivery service in town. A meat company was the first at Rockford to ask for women to drive its trucks.

The Smith Form-a-Truck Corp. of Chicago tells MOTOR AGE that women interested in the national defense movement conceived the idea lately of obtaining use of the truck owned by a regiment of the Illinois National Guard certain hours of the day to teach women how to operate it.

Registration Work

The organization of the woman power of the country under the women's committee of the Council of National Defense has spread so rapidly in two months that now the work of registering for the woman's volunteer service army has actually begun. A national registration card has been prepared. The enlistment is to be made as fast as the state divisions of the woman's committee can get them ready. In scores of places the women already are demanding registration blanks.

The New York motor corps is one of the most interesting and efficient divisions of the league. A member of this division must meet several requirements for active service. She must have a health certificate, a state chauffeur's license, at least two years' experience in driving and a certificate from a motor school. Infantry drill is compulsory and is held twice a week in one of the city armories in New York. The members also are required to take a course in first aid once a week at a hospital. The members of the motor corps wear a khaki uniform, consisting of short skirt, Norfolk coat and cap with visor.

Service performed by women with their cars are numerous. They aid in taking the military census, act as messengers, carry light military supplies and in other ways meet the demands for war service which come through the war department or local military organization.

WOMEN are now on the job loading vessels. They are longshoremen, in other words. Dressed in blue overalls and caps, they learn how to drive the trolley cars, locomotives, trucks and other machinery in use on the docks in loading vessels. These were photographed in Brooklyn at the docks of the Bush Terminal Docks Co. Close to 70 per cent of the men are expected to be drafted and this company is training women to fill the gaps.

In a demonstration before corporation officials the women did all the routine tasks, driving everything around the yard from an electric engine to a freight elevator. They even went aboard a Newfoundland fishing smack and climbed up and down the rigging as though they had been doing it all their lives.

Women here, as in England and France, are stepping in to fill up the ranks of industry. So far they have entered into strange jobs with the same success attained by English and French women.

Do Your Food Best

Since the war began three years ago:

The number of cattle in the United States has increased 7,090,000, but the number of cattle in the whole world has decreased 28,080,000.

The number of sheep has decreased 3,000,000 in the United States and 54,500,000 in the world.

The number of hogs in the United States has increased 6,275,000, but the number of hogs in the whole world has decreased 32,425,000.

The world's meat supply has decreased 115,005,000 meat producing animals.

Since the war began three years ago:

The United States has exported 1,339,192,000 lb. of meat; before the war began, in the three years previous, the United States shipped 493,848,000 lbs.

And the demand on the United States for meat is increasing.

There must be some solution to the short supply of meat for export pending the increase in herds and flocks which will take years. Meat, as well as cereal, must be conserved, its consumption reduced and its waste eliminated.

When it comes to food value **1 lb. of cottage cheese equals:**

1.09 lb. round steak
1.27 lb. sirloin steak
1.31 lb. hind leg of lamb
1.37 lb. breast of veal
1.37 lb. chuck rib beef
1.44 lb. smoked ham
1.46 lb. fresh ham
1.52 lb. fowl
1.58 lb. loin pork chop

Daily Consumption

Careful summaries show that the present daily consumption of beef is 3.6 oz. per capita and of pork, 4.5 oz. If this consumption were reduced 1 oz. a day, replacing an additional ounce by the use of fish, whole cream cheese and local poultry and eggs and doubling the quantity of vegetables, the diet would be improved in variety without lowering its nutritive value. At the same time the meat problem would be simplified. Why not a meatless day?

The Readers' Clearing House

REGAL LACKS POWER ON HILLS
May Be Caused by Broken Rings or Wrong Timing

PLATTE CITY, MO.—Editor MOTOR AGE—My 3¾ by 4½ Regal Model T 1914 underslung does not pull well. It weighs 2800 lb. and is geared 4 to 1. There are a few hills that I can just make on low. I have ground the valves and they are in good shape, also cleaned out carbon; have fairly good compression on three cylinders and very little on back one. I put new cylinder rings in two middle cylinders as they were easy to get out; it helped the compression some, but not in the pulling. Would like information before I take cylinders off to put rings on other two.

2—Car has a Holly carbureter. Would you advise another make?

3—What about the vacuum feed? Describe how it works.

4—What kind of cylinder ring do you think best—a patented leakproof or just the plain rings?

5—Would you advise buying a used carbureter in good condition?—Claude George.

1—You state that you have put new piston rings in the two middle cylinders and not in the others, the rear one of which you say has little or no compression. It may be this cylinder that is causing your trouble. The rings of this one may be worn or broken and the engine should not be run until it is looked over to ascertain its condition. Lack of power in an engine may be due to the cam gears being loose, cams being worn or loose on shaft, scored cylinder, valves not seating properly or there may be one or more defective priming cups, valve caps, or plugs which cause compression leaks. Also examine the spark control rods and see that the spark is properly advanced. Sometimes these rods work loose and the spark instead of being carried in the correct position is retarded, causing the engine to overheat and thus lose power. If your engine has been taken down recently, check up on the valve timing and ignition timing to make sure that these are correct.

Carbureter Adjustment

2—There is no reason why the present carbureter should not give satisfaction, if it is correctly adjusted. However, in view of the fact that the present day grade of fuel is not up to the quality used a few years ago, it may be advisable if you installed a more modern carbureter which can handle this fuel better than the older instruments.

3—The mechanism of the Stewart vacuum tank, together with the manner of installing it on a car is shown in Fig. 1. The tank is mounted on the engine at a point above the carbureter. A pipe going from the top of the tank to the inlet manifold of the engine allows the suction from the engine to draw gasoline from the supply tank, located on the rear of the car usually. When the suction valve in the top of the vacuum tank is open, the air vent is closed. The rising gasoline in the upper tank chamber causes the float to rise, which in turn will cause the suction valve to close and the air valve to open. The opening of the latter causes atmospheric pressure to play upon the liquid and the flapper in the bottom chamber will open, allowing the contents of the upper tank to flow by gravity to the lower one. Then the lowering of the float will again cause the suction valve to open and the air valve to close, whereupon the previous operation is again repeated and so on, as long as the engine runs.

4—Non-leak rings are very satisfactory, but so are also many of the others of the plain variety.

5—If it will help matters, yes.

Piston Displacement of Packard

Gary, Ind.—Editor MOTOR AGE—Has the car driven by Rader in his record-breaking tests on the New York Speedway the same piston displacement as that which de Palma has been campaigning on the speedways this season? If not, give displacement.

2—Is Barney Oldfield's Miller twelve speed car still under construction?—Ray L. Watts, Gary, Ind.

1—Yes. The piston displacement is the same.

2—MOTOR AGE has no information as to the extent of work done on this car up to the present time.

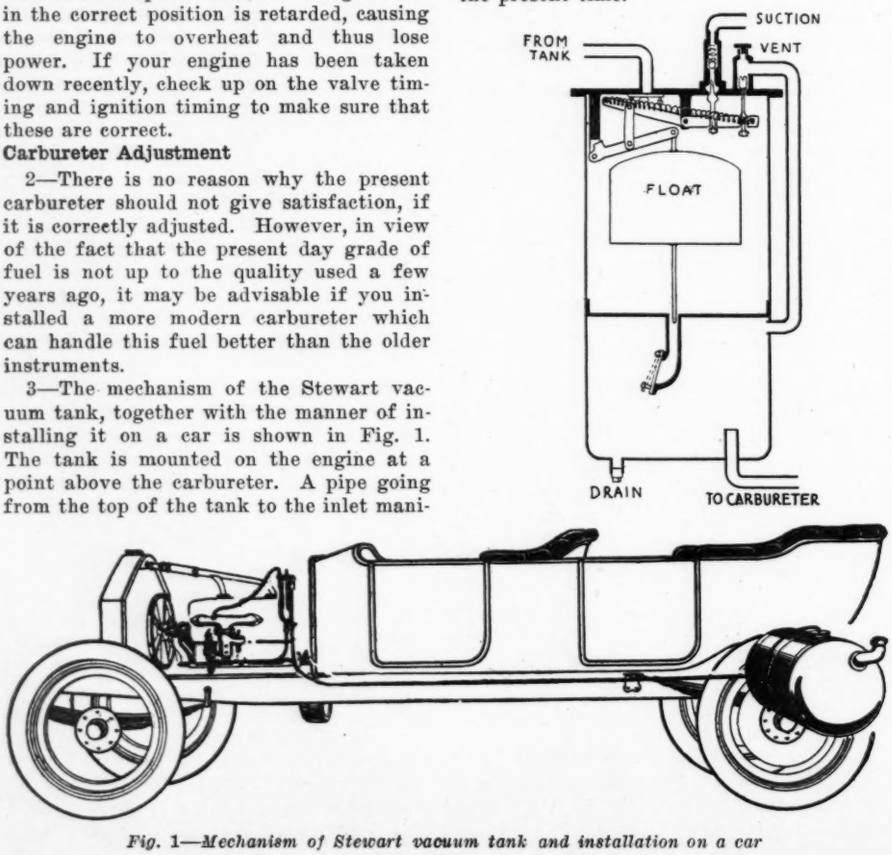


Fig. 1—Mechanism of Stewart vacuum tank and installation on a car

RELAY REGULATOR BURNS OUT
May Be Due to Vibrator Points Becoming Pitted

Peterson, Minn.—Editor MOTOR AGE—We have an Alter car model C, equipped with Remy ignition, and have trouble with the relay regulator burning out while running. Can you tell what causes this?

2—Publish a wiring diagram of this car.

3—Would it be possible to install a magneto on this car, and, if so, how can it be done?—Thompson Sales Co.

The motor generator used in this system is of a shunt wound construction using compound field with relay regulator used for regulation. Therefore, a loose or high resistance connection would tend to raise the voltage of the generator beyond that of the desired value or to such a point as to fuse the regulator.

Further, difficulty might prevail due to the fact that there is a possibility of the vibrating points on the relay regulator having pitted due to excessive heat and the accumulation of dirt which would tend to affect a high resistance connection, thus causing the regulator points to hang over and not effect proper regulation. This would in turn raise the voltage as well as the current output to a very high value, and heat the windings and result in damage like that to which you refer.

Frequent Inspection

2—Inspect your electric equipment at least every two months. See that connections are tight and secure, especially at the coil, switch, ammeter, relay or relay regulator and storage battery. Battery terminals should be kept free from corrosion. To do this disassemble and thoroughly clean both cable lugs and insides of stationary terminals with sand paper or a sharp knife, then tighten securely. When clean, if outside is coated with vaseline, after reassembling, you will have no further trouble with corrosion. The regulator points must be kept clean to prevent a high resistance contact or arcing which may cause the points, in time, to become pitted and possibly permit them to stick, resulting in high output, causing damage. Every six week or two months draw a piece of 00 sand paper between the points to remove any dirt or rough places from all contact surfaces and a piece of clean white paper to remove any foreign substances. If a fuse is incorporated, and blows, do not use a heavier fuse than standard, but find the trouble, as the fuse is placed therein to protect your generator, unless in some cases the current characteristics are such as do not require this fuse.

2—This is shown in Fig. 2.

3—It is possible to install a magneto on this car but it would require special fittings, or a chain-driven affair with no starter or generator, unless the magneto is mounted upon a special bracket, which, owing to the peculiar construction of this engine, would be hard to locate.

Engine Knocks at Intervals

Newton, Kan.—Editor MOTOR AGE—My Jeffery 4, 1913-1914, speedster has developed a tapping knock which seems to be more pronounced when the motor is cold, and which

appears at irregular intervals. Each tap occurs with the stroke of the oil indicator and it seems at the end of the stroke when the hand gets back to its lowest position. What is the trouble?—Walter Reese.

MOTOR AGE is of the opinion that the noise is caused by the oil pump. This condition can probably be eliminated by slightly reducing the action of the catch balls. In order to make the proper repairs it will be necessary to remove the lower half of the crankcase and take out the oil pump. You will find one of the catch balls located in the lower part of the oil pump and the other in the piston of the pump. Care should be taken in reducing the action of these balls that both be reduced alike.

On Reboring Cylinders

Homedale, Idaho—Editor MOTOR AGE—When should a cylinder, 3¾ in. diameter, be reground or rebored, expressed in thousandths of an inch cylinder wear? The cylinders of my Buick model 10 are worn from 17/1000 to 9/1000 in. larger in diameter on the top end than on the lower end.

2—Is the irregularity a serious matter and would you advise having them reground?

3—How badly worn, in thousandths of an inch should a piston be before it is advisable to put in a new one, when the cylinder is still in good shape?

4—Some say that an aluminum-alloy piston requires more clearance than an iron one when fitting them to reground cylinders. Suppose I were to install an aluminum alloy piston to a cylinder that is worn somewhat, would not the cylinder being worn offer sufficient clearance for an aluminum alloy piston? —Bertram Dresser.

1-2-3—Just when it is best to rebore a cylinder is a matter of conjecture. Naturally cylinders are worn more at the top than bottom due to the piston rings. Unless you have a decided piston slap in your engine, perhaps you had better leave it alone for awhile. The Buick company does not advise reboring this block, inasmuch as the cost of a new block is about what it would be to rebore the engine and fit oversized pistons.

4—Aluminum alloy pistons are always fitted with more clearance. This is because the expansive co-officient of expansion power of this metal is greater than that of cast iron. You might be justified in fitting aluminum pistons to your engine, after the cylinders are trued up, but it is a question whether you would gain much, after you figure the expense and other details. Also you cannot fit aluminum pistons direct, that is, without reboring, as the cylinders generally wear oval, due to the piston pin. And if you fit the pistons for the lower part of the cylinders, that is not worn so much, they will be too small for the top. Obviously the lower part must be reground.

Shorter Manifold Advisable

Pennant, Sask.—Editor MOTOR AGE—Would it be advisable to raise the carbureter on an Overland model 80? I would have to install a vacuum system. It would be 6 in. less manifold.

2—I read that some of the race drivers use graphite. Does this mean in the engine, and, if so, how is it applied?

3—In testing a low-tension magneto, I placed a 6 volt, 8 cp. lamp in circuit, which lighted up all right. I then substituted a 3 volt, 2 cp., which did not light. By placing your hand on the lamp you could feel the pulses of the magneto. I tried this lamp on the batteries and it worked all right. Why is this?

4—Does an oversize tire on one rear wheel cause the differential to work all the time?—James C. Barber.

1—Yes, the shorter the manifold nowadays, the better.

2—Some drivers use graphite in the engine in connection with the lubricating oil, while others use it in the transmission

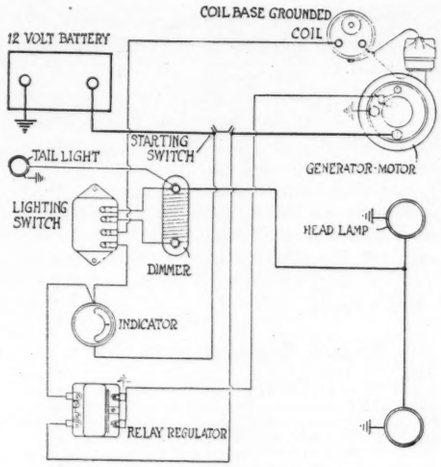


Fig. 2—Wiring diagram of Remy system used on Alter car

case, universal joints or the rear axle, in fact, it might be used in various ways on different parts of the car. When used in the crankcase of an engine in a passenger car, usually about one teaspoonful of graphite is mixed with a gallon of oil. These proportions, of course, may be varied, depending on local conditions. Race drivers have their own particular way of using this lubricant.

3—You do not state whether or not you tried the 3-volt light on the batteries after you tested it on the magneto. If you did and it worked all right, we are unable to account for the strange behavior of it. If you tried it on the batteries first and then on the magneto it is probable that the latter burnt it out.

4—Yes.

COUNTERBALANSING CRANKSHAFT

Revolving Mass Is Acted Upon by Centrifugal Force

Milwaukee, Wis.—Editor MOTOR AGE—What is the correct theoretical formula for counterbalancing a single throw crankshaft to be used in connection with a vertical single cylinder 3-hp. gasoline engine of the four-cycle type operating at approximately 1200 r.p.m.? —W. D. Kellogg.

Considering the case of a single cylinder engine its reciprocating parts might be balanced by outside weights connected to the crankshaft in such a manner as to be moved at every instant at the same speed as the engine piston, but in the opposite direction. This arrangement, however, rather complicates a single cylinder engine and it would be better to fit more cylinders.

P. M. Heldt in his treatise on The Gasoline Automobile points out the fact that it is possible to partly balance a reciprocating mass by a revolving mass and explains it in the following way: A revolving mass is acted upon by a radial force—centrifugal force.

$$F = 1.226\ W\ N^2\ r \text{ pounds}$$

where W is the weight in pounds, N the number of revolutions per second and r the radius in feet. Such a rotating force can be decomposed into two forces at right angles to each other. We will decompose it into a vertical and horizontal component. Referring to Fig. 3 let O A represent the force in magnitude and momentary direction. Then the vertical component

$$O\ B = O\ A \cos e$$

and the horizontal component

$$B\ A = O\ A \sin e$$

When e = o, that is when the weight is directly above the center of rotation, the vertical component is equal to the total force and the horizontal component is nil. The same when the weight is directly below the center of rotation, when e = 180 deg. Each of the components can be represented by a sine curve; that is, a curve whose abscissas represent angles and whose ordinates are porportional to the sines of the angles represented by the corresponding abscissas, shown in Fig. 3.

Dirt Track Records

Macomb, Ill.—Editor MOTOR AGE—What are the world's records for 25, 50, 75 and 100 miles on a dirt track?—W. S. James.

Until Aug. 11 of this year the 25 and 50-mile dirt track records were held by Bob Burman, now dead. These were: 25-mile, 20:28.8, made at Bakersfield, Cal., in a Peugeot, Jan. 3, 1915; 50-mile, 40:58, same place, same car and date. On Aug. 11 Barney Oldfield set new marks, as noted on page 13 of MOTOR AGE for Aug. 16. The 75-mile record is 1:08:54.75, made by Ralph Mulford in a Duesenberg at Galesburg, Ill., Oct. 24, 1914. The 100-mile record is held by Tom Alley; time, 1:31:30. This was made in a Duesenberg at Minneapolis, Minn., Oct. 24, 1914.

Sprung Crankshaft Causes Knock

Salt Lake City, Utah—Editor MOTOR AGE—My D 44 Buick has developed a knock and a thorough overhauling has not remedied it. The knock is not audible under 22 miles but at 25 it becomes very annoying. I can stop it by running the spark retarded, but the engine gets very hot and has no power. In shorting out the different cylinders I found by shorting the first the knock ceases. I took the engine down and tried the cylinders for being true and found same is .003 out. The new piston seems a good fit. I tried putting a 1/16-in. gasket under the cylinder block to reduce the compression, but it did not help. What is the remedy?—C. N. Douglass.

There may be two reasons for this knock. One is that the crankshaft is out of alignment and the other, what is called a piston slap. The only way you can check up on the crankshaft is to swing it between the

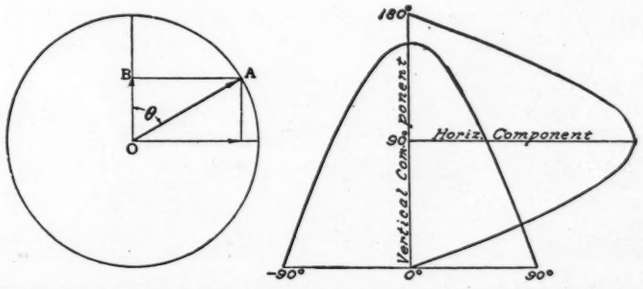


Fig. 3—Curves illustrating formula for counterbalancing single throw crankshaft

centers of a lathe and let it revolve. Crankshafts are frequently sprung by owners who drive fast and then apply the brakes suddenly without properly throwing out the clutch. Even though the crankshaft in this particular engine has four bearings, the fact remains that some of them have been sprung in just this way and set up a knock like you mention.

On the other hand, a worn piston or one that is out of true, will cause a piston slap. In this case it is better to replace the block, because if you attempt to regrind this cylinder only and fit on over sized piston, the engine will be somewhat out of balance. If you reground them all and fitted new pistons the cost might be more than that of a new cylinder block. Further the Buick company does not advise reboring of its blocks and fitting over-sized pistons.

HOW READER SLEEPS IN HIS CAR

Travelling Man Adapts Own Ideas to Roadster Model

Dallas, Tex.—Editor MOTOR AGE—The illustrations you have published from time to time showing how to equip cars for sleeping purposes have interested me very much and consequently I am sending to you a picture of my car which I fixed up for this. Being a travelling man I have found much comfort in the arrangement of my car and thought it might be of interest to some of your readers to know how easy it is to convert a roadster into a sleeping car.

The body, you will note, is a special one. The back of the seat is removable and the seat is made to come forward, in which case the back of the seat drops down in place of the seat and forms a first class bed. You realize, of course, that there is no partition back of the seat, which makes it possible to extend the body under the seat and secure ample comfort while sleeping.

Some other features of this car might be of interest to others. I have three tanks on the car and all of them are handled by cocks from the drivers' seat. One 25 gal. tank is placed on the frame in the usual way and I have another gasoline tank of 7 gal. capacity placed under the rear deck, together with a 4 gal. tank for extra lubricating oil. The seats are only 5 in. high and the windshield 10 in. The top you will notice, is 9 in. lower than standard. I have had the hub caps decorated with my monogram.

Although it took me about two months to convert this car and have had much favorable comment on it. One of the things that appeals especially to me, perhaps from the nature of my business, is the fact that I can carry so much baggage. I can easily carry a half dozen hand bags in the compartment immediately back of the seat and all of the luggage is kept clean and dry.—S. D. Le Gear.

Hudson Racing Car Details

Mineral Point, Wis.—Editor MOTOR AGE—Give details of the Hudson engine used by Ira Vail at Minneapolis, the number of cylinders, kind of cylinders and valves, size of cylinders and how they are geared in the differential.

2—Are the stock cars whose records are advertised the same construction as other 1917 Hudson cars?—N. H. Snow.

1—This car has six cylinders, having a bore and stroke of 3.52 by 5 in. respectively. The cylinders are cast in single block form and have the valves located on the side. In other words, the engine is of L-head construction. The engine is a replica of those used in the Hudson Super-Six cars with the exception that on the racing car the engine is fitted with an auxiliary oiling system. MOTOR AGE does not know the gear ratio, and usually the racing men do not care to divulge this information.

2—Yes.

Wants Shorter Spokes

Kansas City, Mo.—Editor MOTOR AGE—My Hudson 6-54 is equipped with a set of 36 by 4½ McCue wire wheels and I wish to reduce the tire size to 34 by 4½ or 32 by 4½. Can I have the old spokes shortened, or, if necessary to buy new spokes and rims, where can I procure same?—J. F. Fenier.

The best way out of the matter would be, we think, to buy new spokes. Write to the National Screw Tack Co., Cleveland, Ohio, or the Standard Co., Torrington, Conn., which concerns may be in a position to furnish you with the spokes.

Stoddard-Dayton Misses on High

Atlanta, Ga.—Editor MOTOR AGE—Is it possible to take the pistons out from the bottom on a 1913 48-hp. Stoddard-Dayton?

2—Would faulty ignition cause skipping on low speeds in high and not on fast speeds?

3—What speed has been gotten out of one of the above cars? My car has a 15/53 gear ratio, 36-in. wheels and plenty of power on hills but won't go over 45 m.p.h. How can I increase the speed?

4—Would patented rings on the piston help starting on compression?

5—When will production of the Doble steam cars commence?—Robert Dennis.

1—No.

2—Yes, but the same thing might be caused by air leaks in the intake manifold. Such a leak lets additional air into the gas mixture and so rarefies it that the engine will miss at slow speeds or when the engine is not revolving very fast. If it seems to be in the ignition system, look for weak batteries or improper adjustment of the spark coil.

3—We have no records to show what the maximum speed of this car was, but it ranked favorably with other cars of its time. If your car still is equipped with the original carbureter, it is likely that if you remove it and substitute one of the more modern types of instruments that your speed will be increased. Perhaps the engine needs overhauling, the valves ground, etc. If you want a fast car, it must be tuned up to the minute.

4—Yes.

5—The Doble is already in production.

FITTING LARGER PISTONS ON FORD

Pistons and Rings Usually Lapped in Old Cylinder

Horse Cave, Ky.—Editor MOTOR AGE—What is the correct way to fit oversize pistons in a Ford block? Should the same piston be used for lapping purposes that is to be used in the block?

2—How much clearance should a Ford piston have? Is the clearance supposed to be the same at the top and bottom of the piston?

3—Should the wrist pins work freely in the bushing or should they be tight?

4—How much end play should the crankshaft have?

5—Did the Stutz or the Cole ever market a six cylinder car?—Ed. Bowman.

1—When cylinders, pistons and rings become worn to any great extent it is customary to rebore the cylinders and fit new pistons and rings. The latter are lapped in to insure good compression. Such pistons are generally lapped in old cylinders and not in the ones in which they are intended to work.

2—From 0.002 to 0.004 in. Pistons are usually made with a little more clearance at the top than at the bottom, because the top is subjected to more heat and consequently will expand more.

4—They should have just enough clearance that they do not bind.

5—None. If you had end play in the crankshaft of this engine it would cause the magnets attached to the flywheel to be brought farther away from the stationary coils of the magneto, thus causing the current to become weak.

6—The Cole company began making sixes in 1913. Stutz made sixes in 1913, 1914 and 1915.

Details of Mulford Special

Brooklyn, N. Y.—Editor MOTOR AGE—Reproduce illustration of the Mulford Special pleasure car which I understand was published in MOTOR AGE for Dec. 2, 1915. Also give the following specifications if possible: Wheelbase, type of springs, front and rear; type of drive—Hotchkiss or torque rods. Is it a unit power plant? Also give the spring seat center distances, front axle and rear, and the length of the springs.

2—Show how the annular ball races used on the crankshaft of the old Lozier cars, say, type 51, six-cylinder, were put in place and held without using a built-up crankshaft construction. It is certainly unique and no doubt practical; so why do they not use this arrangement on ball bearing crankshaft construction instead of built-up shafts?—J. Edgar Finn.

1—Pictures of this car are not available at the present time. This car had a wheel-

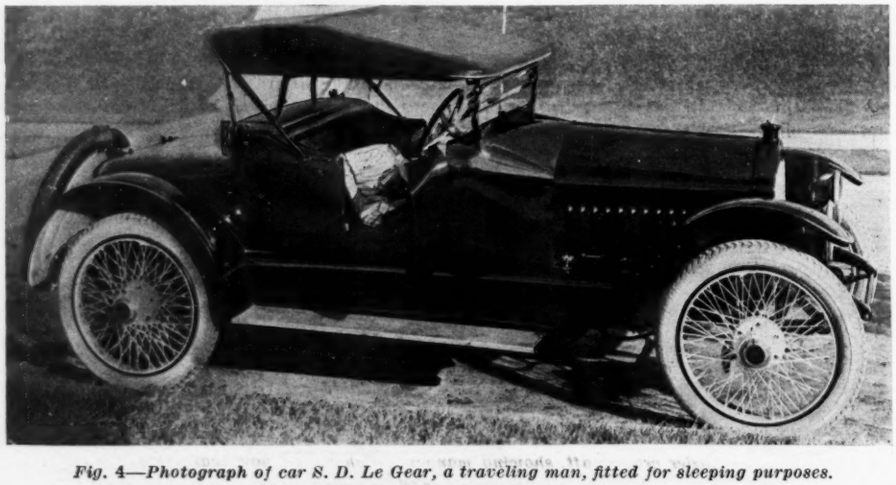


Fig. 4—Photograph of car S. D. Le Gear, a traveling man, fitted for sleeping purposes. The body is a special job

base of 110 in., semi-elliptic springs in front and rear, torque rods, and a unit powerplant. The distance from the center to center of the front spring seats was 28 in. and the rear 34 in. The front spring was 34 in. long and the rear 56 in.

2—The manner in which the ball races were held in place on the Lozier crankshaft is shown in Fig. 5. You will note that the center bearing block was made in two pieces so that it could be readily slipped into place. Each designer has his own particular fancies as to the manner in which the crankshaft bearings shall be disposed of, hence engines are all not built alike.

WANTS TO SET MAGNETO AHEAD

Retarded Spark Will Cause Excessive Fuel Consumption

Memphis, Tenn.—Editor MOTOR AGE—Kindly advise how to proceed to advance spark on a Federal 1½-ton truck, having set spark, Continental motor, Eisemann magneto, to the point where the engine will knock slightly on a heavy high gear.

2—Will advancing spark as stated in question 1 decrease gasoline consumption?

3—Motor runs O. K. in every respect being equipped with new Stromberg carbureter getting 4½ m.p.g. of gasoline. What causes such excess gasoline consumption?—Mascari Bros.

1—To do this, turn the engine over so that the cranks of cylinders 1 and 4 will be on dead center with No. 1 cylinder on the compression stroke. You can determine this by the markings on the flywheel, which should coincide with the pointer above the flywheel. To tell when the engine is on the compression stroke, say for cylinder No. 1, watch the exhaust valve of this cylinder while someone turns over the engine. After the inlet valve seats or comes down as far as it will go, notice the exhaust valve. It will presently rise and then come down again. After it comes to rest, the piston of that particular cylinder is on the top compression stroke. The mark on the flywheel should now be in alignment with the pointer above the flywheel.

Now uncouple the magneto and hold the shaft steady while somebody turns the engine over so that the flywheel mark for No. 1 and 4 cranks will come to a point about 1 in. or 1¼ in. before dead center. In other words, do not let the marks and the pointer above the flywheel coincide. Now couple up the magneto again and the job is done.

2—Yes.

3—Running on a retarded spark will cause this, if everything else seems all right.

Repairing Scored Cylinder

Paris, Tex.—Editor MOTOR AGE—Would you advise the filling of a scored cylinder with one of the advertised preparations, or would it be more economical and satisfactory to purchase a new block?—C. W. Powers.

Much satisfactory work has been done in the way of repairing scored cylinders by the use of nickel-steel alloy or silver-nickel alloy. The process is carried on electrically and consists of fusing the alloy to the cylinder casting. This process has saved manufacturers thousands of dollars in the way of redeeming castings which would have otherwise gone to the scrap heap. For example, a cylinder block comes from the foundry and is found to be defective in one or more of the bores. Ordinarily such a casting would have been rejected as being imperfect, which means a loss of time and money to the maker. With the electric and chemical process of filling up such imperfections, the casting is brought up to standard requirements and is as good in every respect as a perfect casting.

IN WRITING AN INQUIRY To the Readers' Clearing House Department

DESCRIBE THINGS COMPLETELY!

IF your car is giving trouble, tell us all about it and tell us what you have done in trying to remedy the trouble. Bear in mind that we are not looking at your car when we are reading your inquiry. Try to picture everything to us as we might see it if we were looking at your car. You understand it. Make us understand it.

Do not write in and say, "My engine has developed a serious knock. What is the trouble and how can I remedy it?" It is impossible for us to give an intelligent answer to the question. Tell us where the knock is, what it sounds like, what effect it has on the operation of the engine, under what driving condition it is most evident, etc. Let us have the details so we can diagnose the case accurately and quickly.

Do not ask us questions about motorcycles and motor boats. Our field does not cover these industries. Do not ask us for working drawings of engines, gearsets, etc. We conduct an information department, but cannot go into engineering information of such a nature. This applies also to specifications for speedster bodies to be applied to touring or roadster chassis. We gladly will give a general plan of a body, showing how it might appear when complete, but we cannot furnish complete patterns and working drawings for the construction of bodies.

Wants New Gearset

New Bedford, Mass.—Editor MOTOR AGE—I have a 1912 Maxwell Special which is in first class condition, except the first and second speed gears, which I have stripped, this making the second set in two months. Is it possible to put some other gearcase with selective gearshift in this type of car or would it be better to adjust the clutch on this machine and try new gears again?

2—What transmission case would be easiest to fit on this car?—George M. Nunes, New Bedford, Mass.

1-2—Better fit new gears and adjust the clutch. The manufacturer has done all of the experimenting and fitted the type of gearset which seemed best for the car. Stripping of gears is generally due to the way in which the car is handled. Attempting to shift when the clutch shaft is turning over too fast, or trying to force the gears in place, should never be done, as the gears are sure to suffer. We would advise that you fit the same kind of gears and handle the car gently when starting up. It may be possible also that you happened to get hold of some gears that were imperfect or too soft. But in any event we would not advise so radical a change as to fit a new transmission, although realizing that this is an old car and you are tempted to fit more up-to-date units in it.

WHY FORD STARTS HARD WHEN HOT

Reader Suggests Lowering of Gasoline Level as Remedy

Hartford, Wash.—Editor MOTOR AGE—Would like to say a word in regard to the perpetual inquiry, why does my Ford start hard when it is hot? In working at one of the Ford assembly plants I have found that a fairly large percentage are so afflicted, but in the majority of cases, the trouble can very easily be overcome by lowering the gasoline level in the float chamber. The trouble is caused by the motor getting too rich a mixture at a small throttle opening as can be proven by shutting off the needle-valve and cranking engine over a few times, when it will start readily. As a rule after making this change the engine will need some more priming when cold.

I would like to take exception also to part of the article in the Aug. 2 issue of MOTOR AGE on Lighting from Ford Magneto. The addition of a master vibrator will consume more current instead of less, as you state, because it is simply added resistance in proportion to the amount of wire on the master vibrator, since all of the original coil windings are used, the contacts simply being bridged. As far as uniformity is concerned, the master vibrator has the advantage.

Also, the article, Stopping Headlight Glare, in the same issue, S. C. Schmidt evidently has not studied the headlight problem very closely. From one standpoint, the position of lens to be frosted will depend entirely on focus of bulb which he can very easily see by reference to some of the articles in MOTOR AGE a few issues back. In his correct position all reflected rays would be thrown upward if the bulb were back of its local point while in his incorrect position the rays would be thrown upon the road and none upward, at the same time leaving the upper edge of the light cast nearly a horizontal line, while in the correct method if the bulb were moved forward to throw the rays of light on the road the upper edge of the light would show in a sort of semi-circle. Whether the light is thrown in the air or on the road depends on focus, no matter where the stopper is placed.—N. E. Nelson.

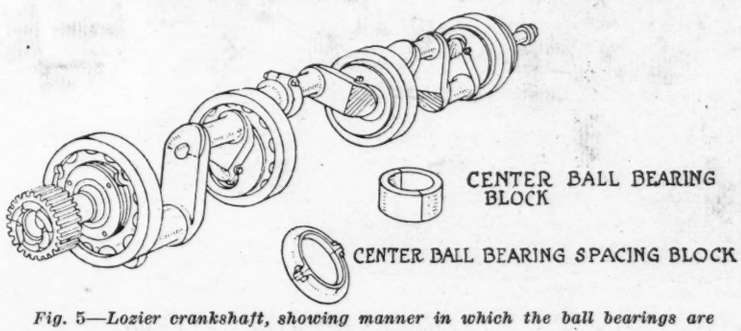


Fig. 5—Lozier crankshaft, showing manner in which the ball bearings are held in place

1918 Buda Standardized

Only Four-Cylinder Engines Are to be Built in Line Next Year

ONE of the influences that the war is having on manufacture crops out in the 1918 plans of the Buda company in the manufacture of its engines for motor cars, trucks and farm tractors. Heretofore the company has built a variety of models including four and six-cylinder designs but for next year it will only produce four-cylinder types and standardization has been carried through these so that although they are built in five different models, the parts entering into them are so standardized that in several of the models many parts are interchangeable. By such standardization the company aims to speed up production at its factory in Harvey, Ill., a suburb of the south side of Chicago. The new Buda plans are really the outcome of war activities, in that standardization is more than ever an essential in manufacture. The government has demanded standardization in aviation engines, using the same pistons in engines whether they have four, six, eight or twelve cylinders. The government is demanding standardization in the military motor trucks. It has called the motorcycle makers together to make them standardize.

Five Models

Buda has five engine models for next year, all four-cylinder types, all with L-head block castings, all with three-bearing crankshafts, all using gray iron for the cylinders, crankcase parts and pistons, all made to take the gearbox as a unit construction if necessary, all made with provision for attaching a magneto, all made for three-point suspension, and all may be described as relatively slow-speed types intended to operate at 1000 to 1100 r.p.m.

Model QU is for motor cars and light trucks such as 1½-tonners; model OU is for cars and heavier trucks; model TU is for cars, trucks and farm tractors; model HU is the government military truck engine, and is a development from the experiences on the Mexican border a year ago; and model YU is a heavy-duty job for very heavy truck work and farm tractors.

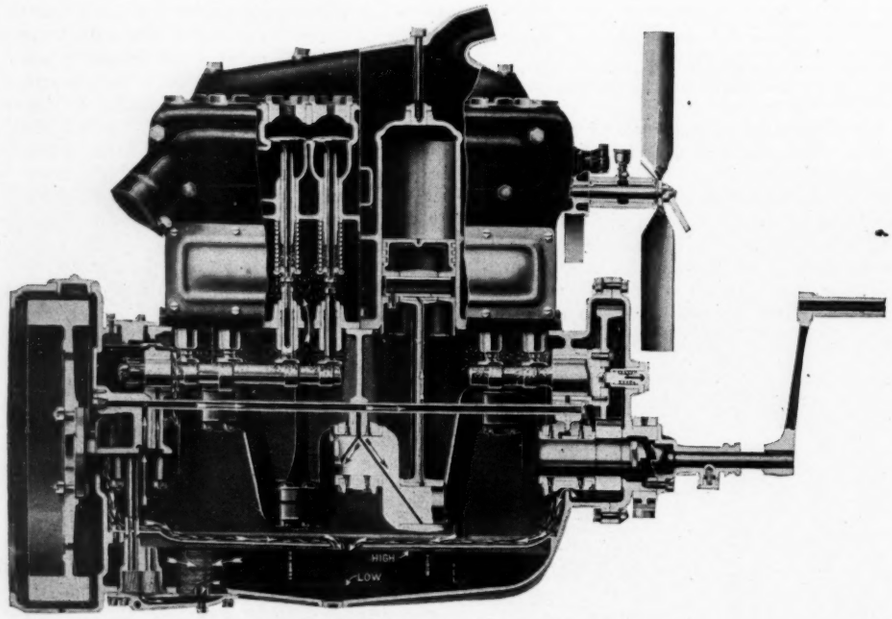
Standardization work has been carried to the last syllable in the first three models, all of which are made with 5½-in. strokes. Practically all parts are interchangeable except those having of necessity larger dimensions, such as pistons, crankcase, cylinder castings and crankshafts. The interchangeability program has not been carried so far in the two larger models.

In the first three models, that is, the lighter-duty types, the oiling is a combination pressure-and-splash, whereas in the two large heavy-duty models it is a pressure system throughout.

In the two heavy-duty models the pressure oiling starts by forcing the oil from the lower level of the crankcase through a steel distributing tube located the entire length of the case. Suitable passages connect with this tube and carry the oil direct to the camshaft bearings as well as to the main or crankshaft bearings. From each crankshaft bearing it flows up the tube on the connecting rod to the piston pins. A pressure of 40 lb. is carried at 1000 r.p.m., which pressure is maintained automatically. The pressure may be regulated by a valve and a gage may be connected with the system to show the operator the pressure at all times. The timing gears also are lubricated from the pressure system by a constant oil level in the gearcase cover. The valve stems and push rods being inclosed are oiled from the crankcase vapor, through holes in the base of each cylinder.

The five models are:

Q U—3¾ by 5½ (cars—light trucks).
O U—4⅛ by 5½ (cars—medium trucks).
T U—4¼ by 5½ (cars—trucks—tractors).
H U—4¼ by 5½ (military trucks).
Y U—4½ by 6 (heavy duty trucks—tractors).



Full-pressure oiling system in two heavy-duty Buda models for army trucks and heavy trucks and tractors

How Ensign Heats Fuel

Latest Model of Kerosene Carbureter Embodies Spark-plug Method

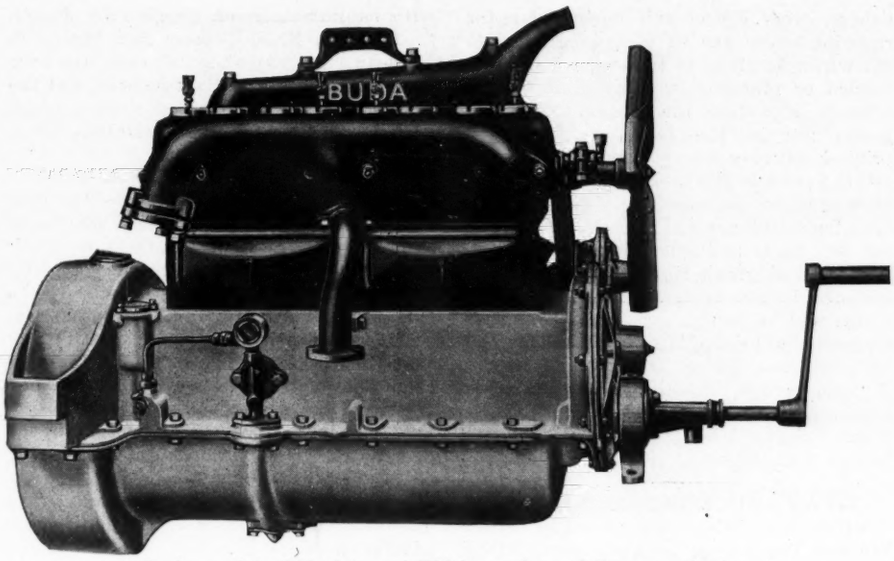
FITTING a spark plug in the carbureter and having a spark pass through this plug in order to burn the heavier fuels and thereby heat the mixture and aid in carburetion is the new principle employed in the latest model of the Ensign kerosene carbureter built by the Ensign Carbureter Co., Los Angeles, Cal. This latest Ensign type N uses no other means of heating the air for the kerosene than by partially burning a part of the mixture in what is called a firebox in the carbureter. This firebox does not correspond with the mixing chamber but is located below it so that the heated air and mixture from the firebox rise through a standpipe and go directly past the throttle. No other method of heating air is used. **There is no hot air** pipe from the exhaust manifold, not even a jacketing of the carbureter, so that in the coldest days unheated outside air is used to vaporize the kerosene. Gasoline is used for priming purposes, there being incorporated in the carbureter a gasoline supply higher up than the float chamber which handles the kerosene so that the gasoline can be dripped by gravity past the kerosene, so to speak, for starting.

Spark Plug Method

This step of using a spark plug to explode and partially burn the heavier kerosene elements is new with O. H. Ensign, who has spent years in developing carbureters to handle the distillate of California and later to handle kerosene.

The sectional illustration shows how the spark-plug method is used. In the bottom of the carbureter is the firebox J, a circular chamber with what is termed a distilling table K, an umbrella-shaped metal piece forming the top of the firebox. The position of the spark plug is shown and this plug is connected in series with one of the spark plugs of the engine so that in a four-cylinder engine there is a spark in the firebox with every fourth spark of the engine. The spark plug in the carbureter is in reality a spark gap in series with one of the spark plugs.

Here is how this carbureter works: The kerosene supply is carried in the float chamber N being float controlled as in the conventional carbureter. In a separate chamber higher up is carried a supply of gasoline P for priming purposes. This gasoline chamber is filled by a primary lever and the contents flow through the nozzle and into the air current by gravity. Kerosene flows from the float chamber as indicated by the arrows down through the valve and hence through the four openings into the mixing chamber D. This chamber is open at the bottom so that the heavy kerosene falls through the bottom opening and falling on the curved surface R flows downwards to a baffle plate or fire screen H. Here it falls through the openings in the screen and drips onto the top of the distilling table K and begins to flow down its inclined surface, into the firebox, where it is ignited by the spark gap. Partial



Buda models QU, OA and TU have three different cylinder bores but the same stroke and are well standardized

combustion occurs, causing the production of what is claimed to be a fixed gas, which is drawn from the firebox up the vertical passage, G, back into the main stream of air from the mixing chamber up past the throttle. Soon the distilling table K becomes heated. The heat from the combustion in the firebox extends up to the throttle and beyond into the manifold so that after 3 sec. running it is claimed that the firebox is well heated, and that in 8 to 10 sec. the intake manifold above the throttle is hot so as to maintain the uniformity of carbureted fuel to the cylinders. The immediate heat which the carbureter thus produces within itself is claimed to make the use of kerosene in the coldest weather quite easy.

Following the operation of the carbureter further: All of the air enters through one opening in the side of the mixing chamber D, the opening being tangential so that a downward whirl is imparted to it, which carries the kerosene from the spraying nozzle. Once through the bottom of the chamber C this air laden with kerosene vapor and kerosene globules divides, part going directly above the standpipe G and past the throttle as indicated at S, part going down into the firebox at T (the latter is a relatively small amount) and part entering a bypass, E, which has a tangential opening into the firebox, thereby causing a rotary motion in the firebox of the

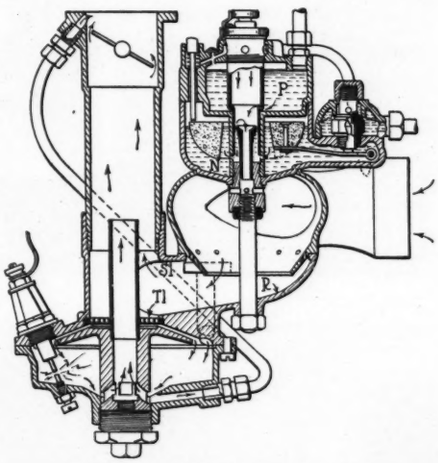


Diagram of Ensign carbureter

flaming fuel. This aids in giving a more uniform mixture. The air entering the firebox through E is relatively free of fuel. It takes up the kerosene that drips off the distilling table. This completes the carbureter process, the lighter kerosene particles being carried direct as indicated by arrows S and the heavier particles getting into the firebox before passing to the engine.

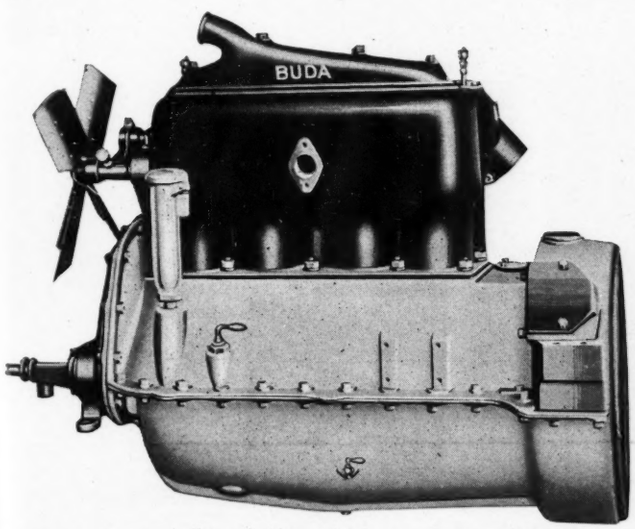
Now for temperature regulation: The temperature is regulated by raising and lowering the distilling table K with relation to the firescreen H by means of the adjustment M. This chokes the extension of the table, thus reducing the draft on fuel and air at this point. When the throttle is at the idling position illustrated the idling bypass tube I draws out from the extreme bottom of the firebox all fuel which has flowed to that point unconsumed. Under wider throttle opening the fuel is drawn up through the gas passage G.

Process of Heat

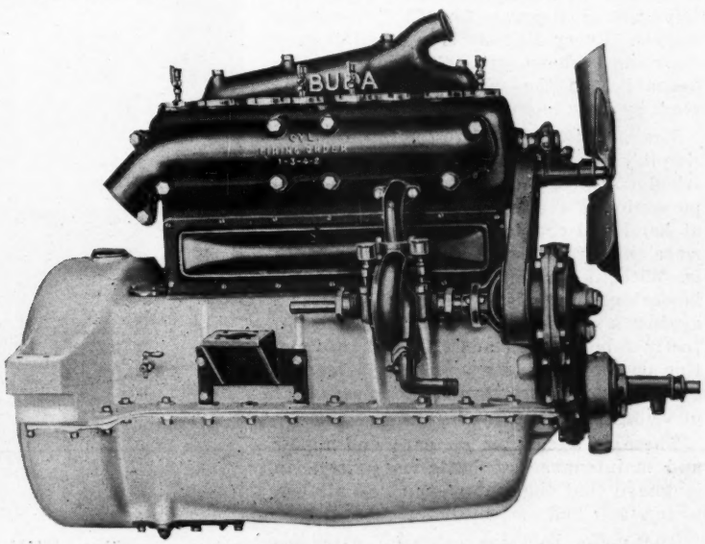
At first starting with the carbureter when cold all of the fuel passes through the firebox. Soon the distilling table becomes heated so that the more volatile elements are distilled therefrom and the vapors thus generated cause resistance to the flow of other than the heaviest bodies through the holes in the fire screen and the fire screen becomes heated. Soon the pipe G is also so heated that all lighter particles of the fuel are highly vaporized and the heavy particles only flow into the firebox to be partially burned.

At full power a certain amount of atomization will take place in the carbureter, which is turned into vaporization upon striking the gas passage G and mingling with the hot gases therefrom so that still less fuel in proportion to the total quantity flows through the firebox at full load, whereas practically all of it flows through the firebox when idling on account of the extreme suction applied when idling.

This results in a claimed wide range of temperatures. For example: The apparatus may be constructed and adjusted to give an idling temperature of 250 to 300 deg. in the manifold and an operating load temperature from 170 to 198 deg. under full load in the manifold. Upon closing the throttle after a full-load run but



Buda model HU is designed especially for military trucks



Buda model YU is for heavy-duty trucks and tractors

a few seconds are needed to cause this temperature to change to the higher temperatures needed for idling.

This results in wide flexibility with a very small call upon the gasoline so that a half-gallon priming tank is claimed to last for several days, requiring only a couple of ounces to make a cold start and a less quantity to make a start after the motor and carbureter are warm. In summer a start may be made on kerosene after a 15-min. stop.

Starting on gasoline is as follows: By a toggle primer, not contained in the illustration, some of the gasoline flows as indicated by arrows into the nozzle and thence down through it and into the air current in D. If there should be any heavy particles they find their way into the bottom of the firebox and may be sucked through the priming bypass tube I above the throttle.

In action this Ensign model is automatic, as already explained, in that the more heavy units there are to get into the firebox the more are combusted there and the more heat is produced through the carbureter and the manifold. Again with more volatile fuel there are fewer heavy particles to get into the firebox, less burning there and less heat generated. In this way gasoline can be used in this carbureter, in which but few heavy particles would reach the firebox and the temperature of the carbureter and intake would be accordingly lower.

The motor is claimed to go into full action without any hesitation and by the time the gasoline in the chamber P is exhausted full power may be obtained from the kerosene. This Ensign model is essentially a heat carbureter but it produces its own heat within the carbureter by the burning gas. No water injection into the manifold has been used and the engine pounding which is a problem with using kerosene, and which pounding is counteracted by the use of water, does not take place. Mr. Ensign is of the belief that the fixed gas coming from the firebox, not claimed to be a completely combusted gas, plays a part in the elimination of engine pounding.

WIRING DIAGRAM GUIDE

The official motor car wiring guide contains wiring diagrams for 463 different car models. Every diagram is in detail, is very clear and is shown just as the equipment is assembled on the car. It may easily be read by any motor car mechanic.

The book is designed to facilitate and to simplify the location and correction of electrical troubles. In almost every case, the possession of the wiring diagram of the car at hand will enable the mechanic to much more quickly determine where the difficulty is. Without a wiring diagram the mechanic is working in the dark whenever he gets up against a system with which he is not perfectly familiar. In addition full information on the fuses to use on various cars is given so that there is never the possibility of using the wrong fuse.

There is a chapter on care and repair and maintenance of batteries written in language that the motor car mechanic can understand and remember.

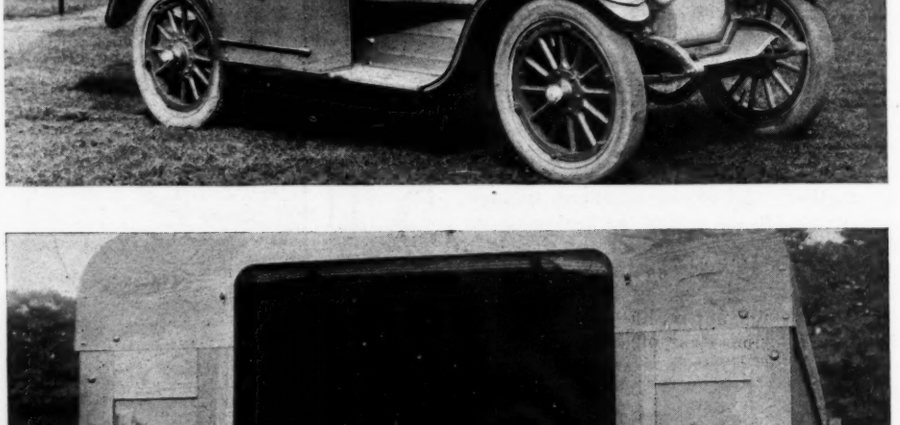
The guide contains complete diagrams for rewiring cars. According to the publishers, every conceivable wiring plan for rewiring every car or for changing present wiring is given so that when wires are burned or otherwise destroyed, it is possible to reproduce the wiring. The diagrams are in the form of blueprints, printed on very heavy paper. The blueprints were selected because the white lines on blue paper are more easily read and the blue tone does not soil readily. The book has 500 pages and sells for $11.50. Practically all diagrams since 1912 to 1917 are included in the book and additional diagrams will be issued from time to time at a reasonable price. It is published by the International Motor Institute, 5 North Wabash avenue, Chicago, and may also be purchased from the U. P. C. Book Co., 239 West Thirty-ninth street, New York, or MOTOR AGE, Chicago.

TITAN TRUCK INCORPORATED

Milwaukee, Wis., Aug. 20—The Titan Truck & Tractor Co. has been incorporated with capital stock of $100,000 by Joseph C. Millman, R. S. Boemer and Henry F. Millman. An experimental shop has been in operation for about six months, and the first models of a 4-ton and a 5-ton truck will be ready for demonstration soon.

NAPOLEON TO TRAVERSE CITY

Traverse City, Mich., Aug. 20—The Traverse City Motor Co., formerly the Napoleon Motor Co. of Napoleon, Ohio, reorganization of which has been recently told by MOTOR AGE, is transferring its property to this city and will start production shortly. Sufficient stock has been purchased to provide for 300 completed cars. Thirty thousand dollars' worth of material was transferred to the new company by the Napoleon company and stock and material has been purchased of the Ross Automobile Co., of Detroit, to the value of $50,000, this being material that the Ross company has discontinued in the new car which it manufactured.

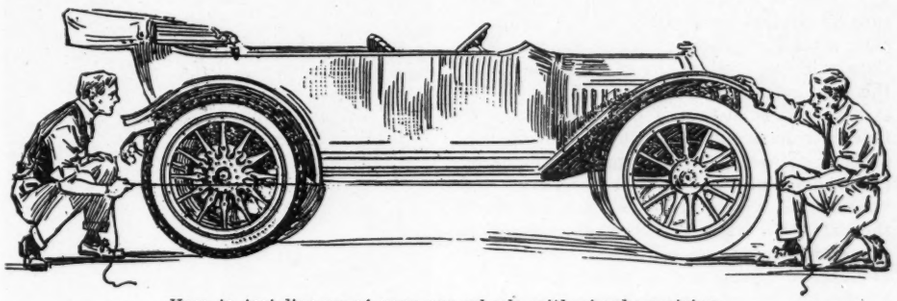


New Willys-Overland ambulance body which sells at $1,250. This body was described in Motor Age for Aug. 16

The Motor Car Repair Shop

Testing Wheel Alignment

CHECKING up on the wheel alignment of a car is not hard to accomplish if the car-owner will take the time to do it. The front and rear wheels on one side of the car should be put straight in line so that a string as shown in the illustration will come in contact with the tires at the front and the rear of each. Having lined the wheels on this side, a string should be carried to the other side of the car where the process is repeated. Should a distance of more than ¼ in. be found to exist between the side of the tire and the string, the wheel is out of alignment. The greater this distance, the greater the wear on the tread. Having discovered this, the wheel should be properly adjusted.—B. F. Goodrich Tire & Rubber Co., Akron, Ohio.



How to test line-up of your car wheels with simply a string

Curing Rusted Rims

Frequently a good tour is marred by the inconvenience and annoyance in changing rims the parts of which have become rusted together. Either the tire may be stuck to the rim, or other parts like the rim lock may be rusted and all of this could have been prevented if the owner had taken a little care before the tire was put on. Usually the owner condemns first the rim, the maker of it and finally the tire that was so imprudent as to stick to the rim. The tire is then usually put back on the rim, giving it still further chance to stick.

Steel rims by the very nature of the metal will rust if proper steps are not taken to avoid it. When the car maker sends out the car, the rims are coated with japan and if kept in this condition will never give any trouble. Rims which have been galvanized do not, as a rule, give much trouble from rusting. Japan, like any other enamel, will in time wear off and if not replaced the rim will rust. But it is not always possible to procure a suitable japan for this purpose and to secure the best results it should be baked on.

A way to protect the finish of the rims is to heat them slightly with a blow torch and apply beeswax to them. This seems to form a new combination with the rust, which will prevent further rust forming.

Correct Speedometer Drive

These are days of economy and if you are keeping tab on the number of miles you are getting out of a gallon of fuel, be sure that your speedometer is in correct relation with the tires. That is, the road wheel gear or sprocket of the speedometer drive must have the correct number of teeth for the size of the tires with which the car is equipped. The number of teeth on the road wheel gear should be twice the diameter in inches of the tire, taking the case of a Stewart speedometer for example, provided that the small pinion which meshes with this gear has 16 teeth.

Where cars come already equipped with a speedometer all the calculations have probably been correctly carried out, but there are many owners who fit their cars with over-size tires and are totally ignorant of the fact that their speedometer readings are incorrect. To cite a specific instance, suppose a car to be equipped originally with 34 in. tires and the owner changes them to 35 by 4½ in., known as oversize tires. In order that the readings of the speedometer be correct, the gear or sprocket on the road wheel should be changed to one having 70 teeth, whereas the old one had only 68.

The above is true of the Stewart instruments and does not necessarily hold with other types, depending on how they are calibrated. It should also be borne in mind that the indications of a speedometer are not correct if the tire is worn very badly or run in an under-inflated condition. Proper allowance must also be made if the tires are fitted with armored devices for protection, which increases the wheel diameter. Whenever the road wheel gear is changed to accommodate a different sized tire, the small pinion must also be changed in order that the two will mesh properly.

NELSON TWO-TONNER EXHIBITED

Saginaw, Mich., Aug. 17—The 2-ton truck, the first model of the new Jumbo line to be manufactured by the Nelson Bros. Co., is on exhibition. It is expected that about fifty of these trucks will be manufactured within the next two months. For the present this truck is being assembled at the Nelson Bros. Co. plant but soon an addition is to be made to the factory to permit manufacture of nearly all the units. As yet no selling price has been placed on the new truck but it is expected that the price will place the truck in the popular-price class.

GUIANA INCREASES CAR IMPORTS

Georgetown, British Guiana, June 30—Approximately eighty cars were imported into British Guiana during 1916, nearly all of which were of American origin. The use of cars has increased rapidly within the last two and one-half years. Of the 400 cars now in use about half were received during that period. The popular local price is from $550 to $1,400.

PULLMAN SALE HELD UP

York, Pa., Aug. 16—The recent sale of the Pullman Motor Car Co. for $408,000 has been held up, objections having been filed by L. Goldstein Sons, Philadelphia, Pa. The latter company purchased the service department of Pullman for $115,000 but object to confirmation of the sale, claiming certain typographical errors.

Caring for Tubes

If an inner tube, usually not subjected to as much unconscious abuse as a casing, is run under unfavorable conditions it can be ruined in a short while. For instance, when a tire goes flat and the tube is kept in it for even a short distance, it will be spoiled by being ground between the rim and casing. Care must also be exercised when applying tires that the tube be not pinched between the bead of the casing and rim. To obviate this, the tube should always be partially inflated before it is placed in the tire.

Much damage is done to tubes by improper application of tire talc or soapstone. Too little of this material is just as bad as too much. If not enough soapstone is applied, the tube has a tendency to stick to the casing and may be torn when taken out. When more talc is put in the tire than necessary, the excess amount is apt to cake and thus grind into the tube. Special care must be taken that a tube which is wet is not placed in a tire before it is perfectly dry. Moisture will cake the soapstone and eventually burn the tube, making it porous.

Some owners do not take the proper precautions to clean out the casing before the tube is applied. Little bits of sharp sand and gravel become lodged in the casing and as the tire revolves the particles will be ground into the tube and cause numerous punctures and so-called slow leaks. These particles come to the bottom of the tire when the tube is taken out and can be removed by wiping out the inside with a cloth that has been dampened with gasoline. After this just enough talc should be sprinkled into the tire so that it will not form a pile in the bottom of the casing.

The Accessory Corner

Harding Catalytic Spark Plug

DESIGNED so that it produces sufficient heat to oxidize a fraction of the mixture by fireless combustion on the compression stroke of the cylinder, the Harding Catalytic spark plug falls in the category of the non-carbonizing type. The catalytic structure is such that it produces heat sufficient to burn off the carbon from the insulator while still heated from the flame of the explosion. There is a percentage of excess free oxygen in all engines, but since the oxidation with this plug takes place on the compression stroke when there is an abundance of oxygen in the cylinder, the combustion through which the carbon is removed is made easier. This plug is made by the Flameless Combustion Spark Plug Co., 6316-20 Stony Island avenue, Chicago.

Ideal Hood Fastener

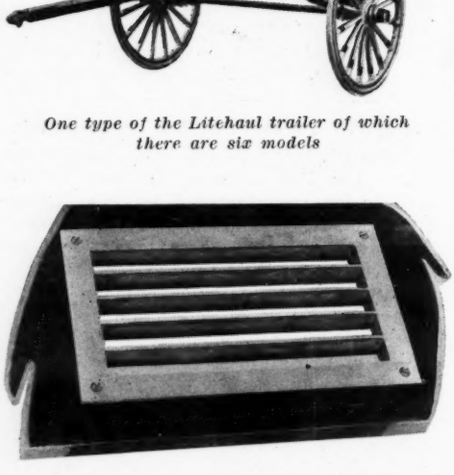
Elimination of hood rattles as well as fastening the hood down are the features claimed for the Ideal hood fastener, made by the Ideal Brass Works, Indianapolis, Ind. The fastener is made of sheet metal, which makes possible a low price, and has attached to the lower end a rubber bumper, which keeps the side panel of the hood from rattling. These fasteners come in black enamel or full nickel finish and are equipped with various types of bases to fit different assemblies. In black enamel a set of four lists at 80 cents; if bumper is not included, 60 cents.

Alemite Process of Die Casting

This process is a method of producing intricate mechanical or motor car parts by casting metal in smooth steel moulds or dies automatically at high pressures. The automatic die-casting machines, the dies or moulds and the alloying and compounding of the metals from which parts are cast, constitute the Alemite process. The dies or moulds consist mainly of two steel blocks having one or more cavities or depressions corresponding accurately to the parts to be cast. The surfaces of these cavities are perfectly smooth. With the two blocks placed face to face and secured firmly in the die-casting machine on which they are mounted, the molten metal is forced into the cavities under heavy pressure. Almost as quickly as the dies are filled, the metal solidifies and cools sufficiently to be removed from the dies, which is accomplished by automatic ejectors. When the castings are intricate and have holes, threads, etc., to be cast, movable cores are built into the dies. These are automatically withdrawn from the castings before the dies are separated by the machine. The advantage of die cast parts is that they are exact duplicates and thus interchangeable. These castings require no machining, inasmuch as the surfaces are smooth and all holes and threads or other irregularities are automatically cast and the parts are ready for assembling without any additional hand fitting. Alemite Metals Co., Chicago.

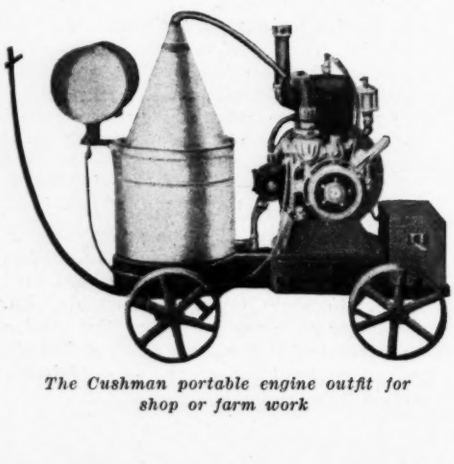
The Britton signal, control of which is mounted on the steering post

One type of the Litehaul trailer of which there are six models



The Kepner running-board shoe cleaner which is a series of bars

At the left is the Ideal hood fastener and above is the Holdford brake



The Cushman portable engine outfit for shop or farm work

Litehaul Trailer

Litehaul trailers are designed with certain constructional features to give required endurance and to withstand road speeds commensurate with the hauling of light loads. Employed with these trailers is a special spring buffer coupler which absorbs the jolts and jerks common to starting and stopping, easing the strain on motive power, the engine, the gears and tires. These trailers are of the two-wheeled type and are made in six sizes. The frame is angular steel, united at the forward end, the springs are semi-elliptic and the axles are 1¼ in. steel fitted for plain or ball bearings. Wheels of the No. 1 and 2 types are 34 in., the No. 1 having steel tires and the No. 2, rubber. These two have plain axles, while the No. 3, which has 30-in. wheels, is fitted with ball bearing axle. These three types have a capacity up to 1200 lbs. and sell at $55, $65 and $80 respectively. The No. 4, 5 and 6 types are for loads up to 1000 lbs. and sell at $45, $55 and $70. This line is made by the Puffer-Hubbard Mfg. Co., Minneapolis, Minn.

Cushman Engine

Balanced crankshaft, sensitive automatic throttle governor, general equipment and special design are the features of the Cushman engine, made by the Cushman Engine Co., Lincoln, Neb. This engine is a very light, four-cycle and is equipped with a Schebler carbureter. It is fitted with a friction clutch pulley, has water pump cooling, is throttle governed and the gears are inclosed, running in oil. These engines are fitted to a portable base and can be used in many ways about the shop, garage, or on the farm for light work. Larger sizes of similar type are also made.

Holdford Brakes

An external contracting brake for Ford cars, which can be easily and quickly installed to act from the hand lever as emergency brake, or from the foot pedal as service brake is being marketed by the G. H. Dyer Co., Cambridge, Mass., under the name of Holdford at $8.50 per set for hand brake and $10 for foot brake. The band and brace of these brakes are of steel, the toggle crank and bracket are drop forgings

and the lining is J-M non-burning. These brakes are guaranteed not to drag when released and that no adjustment for wear is necessary.

Amco Light Deflector

After patent litigation which has lasted over a year, the Amco light deflector is again being marketed by the Art Metal Mfg. Co., Cleveland, Ohio. This device is a small, white-enameled cup reflector that is snapped on the bottom of the light bulb and serves to deflect the light to the upper half of the silvered reflector, where it is projected outward and downward to the road in front of the car. Price, per pair, $1.

Turner Lead Burning Outfit

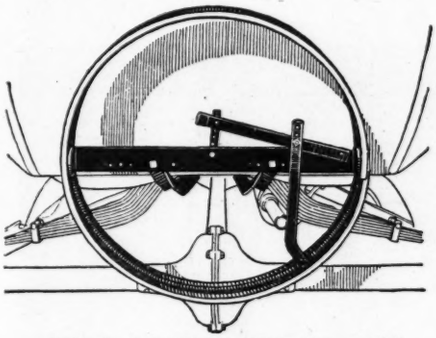
Specially adapted for brazing and welding, the Turner lead-burning outfit, made by the Turner Brass Works, Sycamore, Ill., is designed for using oxygen combined with either illuminating gas, acetylene or hydrogen, or with air pressure combined with these three gases. With this outfit storage batteries can be repaired quickly and efficiently and this apparatus is adapted to nearly every condition of the shop. With the torch of this outfit so constructed that the flame can be controlled to any size and temperature desired lead burning is very feasible. The torch construction is such that the pressure from air or oxygen will syphon and thoroughly mix the gases. The complete outfit lists at $12. A special torch may be had for $4.50 extra.

Universal Detachable Tractor Lug

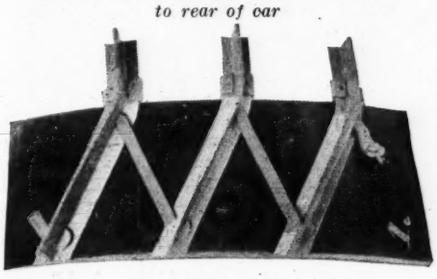
Too frequently tractors with fixed lugs on the drive wheels are outlaws on the public road. Lugs that do not materially damage highways may materially hamper the tractor in working in loose earth. Traction or grip is the most important part of tractor operation. Long lugs that are necessary when working in the loose earth are injurious at times on hard surfaces. They impose a multitude of jars and jolts to the tractor construction. To meet this situation the Universal Detachable Lug Co., 25 North Dearborn street, Chicago, offers a detachable lug that is made of cold rolled steel, delivers traction that is deep and strong and the whole set of which can be removed in 5 min. These lugs are made for any type of tractor.

Continental Motor Stand

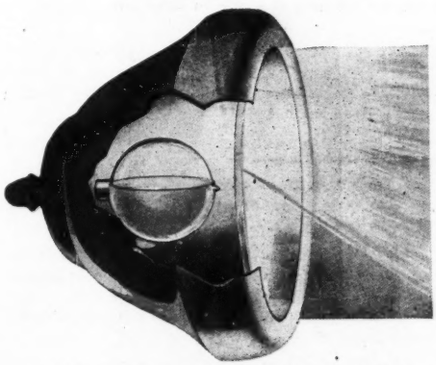
The Continental Motor Stand is designed to handle any engine, from that of the smallest passenger car to the large truck engine. It is instantly adjustable to any width from 0 to 30 in. The stand itself occupies a space of 29 by 36 in. on the floor and the height is 39 in. The engine to be adjusted or overhauled is placed on the stand in the same manner as it is fitted in the car. All the necessary bolts and clamps to secure the engine to the stand are furnished as part of the complete equipment. A Ford attachment and an attachment for holding three point suspension engines is also furnished. After the engine has been clamped to the Continental stand, it can be completely inverted if desired, or locked in any intermediate position, so that the part of the engine that is to receive attention is brought to the proper working height. A small steel pin is used to lock the stand in position. This pin is permanently attached to the stand by a chain, hence it cannot become lost or mislaid. The heavy double wheel castors with which the stand is equipped make it portable, so that an engine can be removed from a car and be immediately placed upon the stand and if necessary, the latter pushed to the repair shop. Continental Auto Parts Co. Knightstown, Ind.



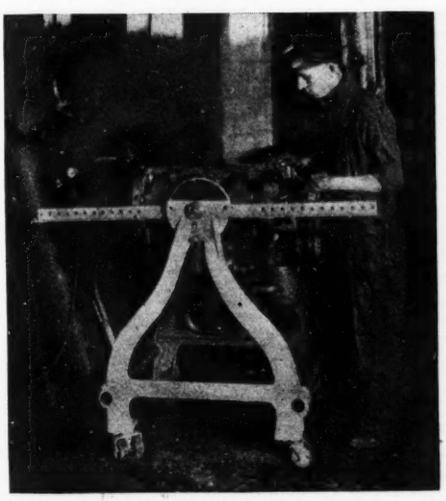
Method of attaching Hayes tire carrier to rear of car



Universal tractor lug which is designed so that it may be attached or detached in a few minutes



The Amco light deflector, which consists of a cup that fits over the bottom half of the bulb



Continental motor stand designed to handle any engine

Runningboard Shoe Cleaner

A metal plate shoe cleaner for attachment to the runningboard of the car is being marketed by Oliver B. Kepner, 1514 Paseo street, Kansas City, Mo. The device is a plate with a series of cross-bars through which the dirt from the feet falls to the ground, thus eliminating much of the dirt that is tracked into the front and rear compartments.

Hayes Tire Carrier

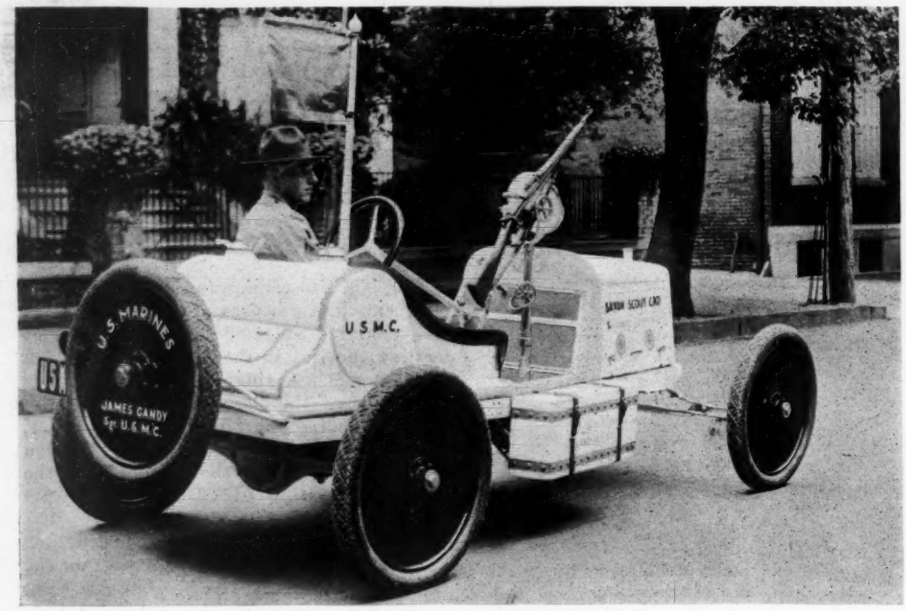
This is a tire carrier for Ford and Chevrolet cars. It consists of a flanged metal rim, mounted at the rear of the car and holding the tire in much the manner of a clincher rim. A ridge in this rim presses the bands of the tire out against the rim flanges, holding the tire securely in place, after it has been expanded by means of a lever. The lever may be padlocked in the expanded position and prevents mud and water from splashing into the tire. The carriers come complete and are provided with holes for the number as well as the tail light bracket. The single type costs $4 and the double type, $6.—Onguard Auto Necessities Co., 982 Woodward avenue, Detroit.

The Britton Signal

The Britton Auto Signal consists of an electric motor that operates a white translucent hand the size of a man's, mounted on the extended armature of the motor. Above the hand and also attached to the armature of the motor is a semaphore, 2½ in. high by 4 in. wide. On each side of the hand is the word "TURN" in red letters. On one side of the semaphore is the word "GO" in a green background and on the other side is the word "STOP" in a red background. The housing of the motor is finished in black enamel, and is 3 in. in diameter and about 4 in. high. The motor operates the hands and semaphores in the four directions: ahead, right, left and back or stop. When the hands point ahead, the word "GO" appears both front and rear on the semaphores. When the hands point backward, indicating a stop, the word "STOP" appears both front and rear. For use at night the hands and semaphores are illuminated by a light on the inside of the hand.

One of these signals is mounted on the front of the car, preferably on the inside of the left front fender, the other one on the rear, either on the license bracket or rear fender. The operation of these motors is from the ordinary 6, 8 or 12-volt storage battery, or from four to six dry cells. The control is from a switch mounted on the steering post, which is adjustable to meet the wishes of individual motorists. A slight movement of a lever to the right or left is sufficient to operate the signals to indicate any intended movement of the car. All wiring is concealed in armored cable. Complete with full instructions for installation for $25.—L. L. Britton Co., Toledo, Ohio.

Among the Makers and Dealers



A SAXON WOULD A WARRING GO—Meet Sergeant James Gandy and his war horse, presented to him by Charles Schutte, Saxon dealer at Lancaster, Pa. Metal body, mount for regulation Springfield gun and searchlight prove this car ready for the enemy. Everything that could be eliminated has been taken off and the car is ready for action

WHITE and Weeks Army Engineers—George A. White and Ray Weeks, engineers of the Sparks-Withington Co., have joined the engineering forces of the government.

Rowley to Direct Federal Truck Sale—W. C. Rowley has been made vice-president of the Federal Motor Truck Co. and will have charge of sales.

Smith to Manage K. C. Mason—H. C. Smith has been appointed manager of the Kansas City branch of the Mason Tire & Rubber Co., Kent, Ohio. Mr. Smith succeeds G. C. Van Veen, who has been transferred to Chicago to open a branch there.

Detroit Truck Gets New Men—H. A. Condon, sales manager, and E. A. Haskins, production manager, of the Federal Motor Truck Co., have resigned to join the Detroit Truck Co. D. F. Whittaker has been made advertising manager of the Detroit Truck Co.

Parsons Heads Brown-Hare-Parsons—D. R. Parsons has been made president of the Brown-Hare-Parsons Co., general distributor for the Disco Self-Starter Corp. Mr. Parsons is a brother of George K. Parsons, manager of sales and agencies for the company, and has formerly been identified with marine engine business.

Denman Becomes Major in Army—Walter H. Denman, sales manager for the Brockway Motor Truck Corp. in New England, has been appointed a major in the Army and ordered to report at one of the camps to supervise the construction of buildings, etc. He is an engineer by profession. Arthur C. Jones succeeds him as New England sales manager.

Standard Roller Bearing Directs Sales—The Marlin-Rockwell Corp., having acquired the assets of the Standard Roller Bearing Co., Philadelphia, Pa.; Rockwell-Drake Corp., Plainville, Conn.; Mayo Radiator Co., New Haven, Conn.; and Marlin Arms Corp., New Haven, Conn., as previously stated, announced that owing to the well-developed sales organization of the Standard Roller Bearing Co. it will direct the sales of these companies with the exception of the Marlin Arms division.

General Motors to Expand—The General Motors Corp. plans expansion and is arranging for the vacation of portions of property in Flint, Mich., on which it will erect new factory buildings.

Petitt with Pan-American Motors—William H. Petitt has been appointed chief engineer of the Pan-American Motors Corp. Mr. Petitt formerly was associated with the Olympian Motors Co.

Suchland with Bimel Spoke & Wheel—J. C. Suchland has been appointed chief engineer for the Bimel Spoke & Auto Wheel Co., Portland, Ind. Mr. Suchland formerly was superintendent of the motor car wheel department of St. Mary's Wheel & Spoke Co.

Smith with St. Louis Overland—Paul A. Smith has been made general manager of the Overland Automobile Co., of St. Louis, Mo. Mr. Smith formerly was manager of the Philadelphia zone and district sales manager of the west central district, including the St. Louis territory, for Willys-Overland, Inc.

Swinehart Tire Resumes Operations—The Swinehart Tire & Rubber Co., Akron, Ohio, has resumed full operations after a shutdown of four weeks. The company was forced to shut down its plant because of the breakdown of a large engine and because of necessary alterations in various departments. The plant is going ahead at full capacity.

Carpenter Heads K. C. Studebaker—E. R. Carpenter, formerly branch manager for the Studebaker Corp., motor car division, San Francisco, Cal., is now branch manager at Kansas City, Mo., succeeding W. S. Williams. Mr. Carpenter has installed the same system as to service prevailing in San Francisco, maintaining at the Studebaker headquarters shop ten men for free service to new owners, and appointing garagemen over the city to which Studebaker owners may go for service and repairs that are to be paid for.

Marshall Castings Has Doble Order—The Marshal Castings Co. has an order from the Doble Steam Car Co., Detroit, for 15,000 sets of castings of sixteen pieces each with a weight of 230 lb. to the set.

Long-Wear Tires After September 1—The Long-Wear Rubber Co., Elyria, Ohio, will commence the manufacture of motor car tires and tubes Sept. 1, and will employ 100 men at the start. The company has purchased a site and is installing the necessary machinery.

St. Louis Foundry Taken Over—The St. Louis Foundry & Mfg. Co. has been taken over by Orville Allen, J. I. McCormick and C. L. Graham, of Alma, Mich. The company has been reorganized and is now known as the Gratiot Foundry Co., with a capital of $50,000.

Universal Truck Body Adds—The Universal Truck Body Co., Janesville, Mich., is erecting a new factory and will greatly expand its business. The officers are: President, Harry Den Bleyker; vice-president, D. L. Seymour; secretary-treasurer, Fred A. Appeldoorn.

Oakland County Motorists Organize—Motorists of Oakland County, Michigan, have formed an organization known as the Oakland County Automobile Club. Officers include: Fred A. Parks, president; Cramer Smith, vice-president; D. J. Moreland, secretary; E. B. Linabury, assistant secretary; Charles J. Merz, treasurer.

Oldsmobile Ships Sixty Carloads One Day—As a climax to a year of unusual expansion and growth, the Olds Motor Works celebrated the close of its fiscal year by loading a solid trainload of sixty motor car cars for Kansas City, Mo. The shipment contained 207 Oldsmobiles, valued at $283,761. Transportation charges alone were more than $15,000, and the train was half a mile long.

Hood Rubber Co. Increases Stock—Stockholders of the Hood Rubber Co. have voted to issue $1,250,000 additional preferred stock and $500,000 common stock. Common stockholders will receive right to subscribe for one share of new common stock for every share now held. The authorized preferred stock was increased to $5,000,000, and authorized common to $1,000,000; therefore, the company will have in treasury $1,000,000 unissued preferred stock and $500,000 common.

Lied Back with K. C. Branch—E. M. Lied, formerly assistant branch manager for the Willys-Overland company at New York, has assumed his duties as branch manager for this company at Kansas City, Mo., succeeding S. M. Ramsay. Mr. Lied, previous to his two years in New York, was district sales manager for the same company at Toledo, Ohio.

McGraw Tire Managers Meet—All the branch and district managers for the McGraw Tire & Rubber Co., East Palestine, Ohio, met in convention for the annual sales conference. Sales policies were discussed preparatory to announcing the 1918 sales campaign. The following changes in personnel were noted: R. E. Hayslett, formerly with the Timken Roller Bearing Co., now assistant to John Morgan, vice-president and treasurer of McGraw Tire & Rubber Co.; R. G. Nelson,

formerly assistant sales manager, now director of sales with direct control over all general office and branch sales; F. C. Strayer, Atlanta district manager.

Victor Wire Wheel Is Formed—The Victor Wire Wheel Co., Kalamazoo, Mich., has been incorporated with a capital of $500,000 and will manufacture wire wheels for motor cars.

Michigan Tire Plans Factory—Michigan Tire & Rubber Co., Coldwater, Mich., will build a two-story, 60 by 300 ft. factory and also one of 60 by 60 ft. A total expenditure of about $60,000 is involved.

Elgin Tractor May Move—The Elgin Tractor Co., Elgin, Ill., it is said, will remove its plant to Piqua, Ohio. Work already has commenced in remodeling a building to house the plant.

Stearns Vice-Presidency for McGuire—W. F. McGuire, formerly production manager of the Ford Motor Co., has been elected vice-president of the Frank B. Stearns Co., Cleveland, Ohio.

Reo Completes 1918 Contracts—The Reo Motor Car Co has completed the signing of the 1918 contracts with all dealers in the United States and Canada. The new contracts show a larger percentage of allotments.

St. Louis Sees New Ford Truck—More than 800 persons called to see the Ford truck the first three days it was on exhibition at the branch in St. Louis. The coming of the truck was unexpected and it was found in a car of motor car parts.

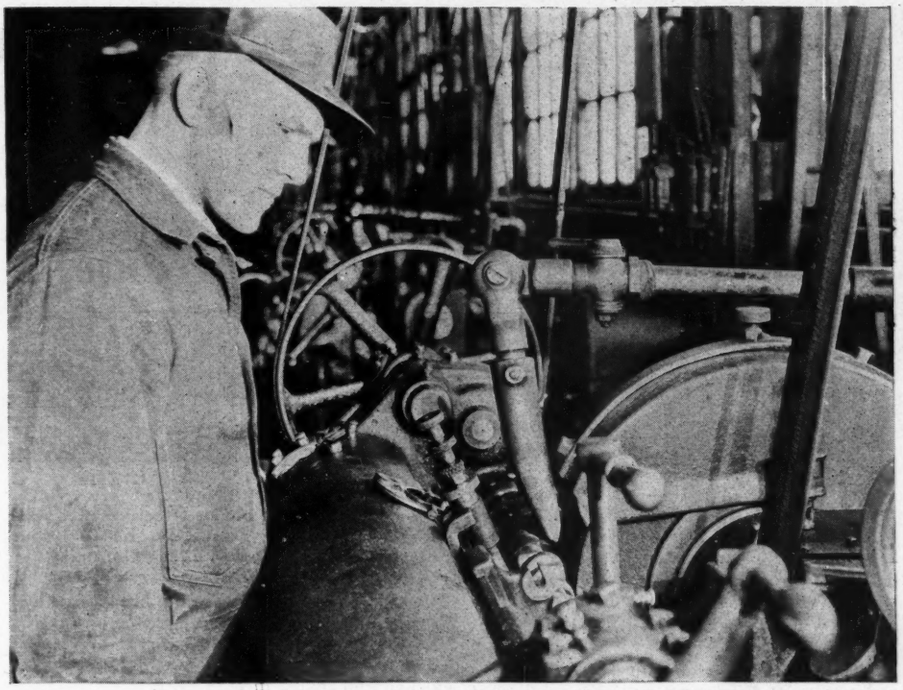
Maxwell Transfers New England Zone—The New England zone of the Maxwell Motor Corp. has been removed from Boston to Long Island City, and Hoover Holton, who has been in charge here for two years, has been transferred to the latter place, as New England and the Eastern section will be consolidated there.

Spanish Distinction for Willys—The unusual distinction of "Purveyor to His Majesty the King of Spain" has been conferred on John N. Willys, president of Willys-Overland, Inc., Toledo, Ohio. About a year and a half ago King Alfonso bought a Willys-Knight touring car. Later in the year he ordered six Willys-Knight touring and limousine models. The title was the result.

Hayes Truck Increases Capital—The Hayes Motor Truck Wheel Co., St. Joseph, Mich., has increased its capital stock from $100,000 to $500,000. The company has increased its business more than 200 per cent during the last year and in consequence increased the capital stock to provide additional working funds to care for the growing business. The new issue has been taken up mainly by the present stockholders.

Indianapolis Dealers Organize Motor Row—Indianapolis, Ind., motor car and accessory dealers with places of business in North Capitol avenue have taken preliminary steps to organize what will be known as the Indianapolis Motor Row Association. The purpose of the association will be to beautify and advertise motor row. Ornamental street lighting systems are to be installed, and the streets are to be improved to encourage motorists to drive there more frequently.

Doss Tire to Build Plant—Doss Rubber and Tube Co., Atlanta, Ga., will build and equip a plant for the manufacture of inner tubes and tires. Between fifty and seventy-five men and women will be employed at the beginning. The tube is known as the Doss puncture-closing inner tube. It comprises a greater thickness of body than the ordinary inner tube, with certain uniform undulated corrugated surfaces which, when the tube is inflated, are forced out in a circumferential alignment with the fabric of the casing placing the rubber of the tube under a constant state of compression, by which means all holes made by nails and other pointed objects are automatically closed, thereby preventing escape of air. The Doss company is now operating a plant in Newark, N. J.



MAKING GASOLINE STRETCH INTO MILES—The grinding and polishing of camshafts is considered one of the most important links by the chain of workers who make Maxwells. The delicate instrument shown measures to a thousandth of an inch. Accuracy saves gasoline. Camshafts lift and lower the valves that admit gasoline vapor

To Aid Government in Designing—The Fuller & Sons Mfg. Co. has sent K. W. Hooth, of its engineering department, to Washington to help work out a transmission design for the War Department.

Chapin Will Direct Porter Sales—R. H. Chapin has been appointed assistant general manager and director of sales for the Porter Mfg. Co., Ann Arbor, Mich. Mr. Chapin recently resigned as sales manager of the Weldon Co.

Carey and Ambrose Leave Chandler—C. A. Carey; formerly purchasing agent, and C. R. Ambrose, formerly assistant engineer of the Chandler Motor Car Co., have joined H. J. Walker & Co., where Mr. Carey has become director of sales and Mr. Ambrose chief engineer.

Lexington Adds to Plant Capacity—With the completion of an addition 100 by 200 ft. to its plant at Connersville, Ind., officers of the Lexington Motor Car Co., Indianapolis, Ind., will consider plans for the construction of a second addition to the plant to be completed this year. The first addition will be occupied in about thirty days.

Denver Overland Helps Recruiting—When Willys-Overland, Inc., of Denver, noticed the recruiting officers of the Colorado National Guard were having difficulty in getting in cowpunchers from outlying districts, the concern decided to make it possible for the recruiting officers to go to the cowpunchers. An Overland was turned over to an officer, and thirty-two recruits were the result.

La Crosse Offers Bonus to Workers—The La Crosse Tractor Co. has supplemented its recent offer to factory employees of a bonus of 10 per cent of their wages from July 1 to Nov. 1, provided they stay with the company throughout the season, with an added bonus amounting to from 8 to 10 per cent of their wages for the coming three months. This is contingent on the amount of tractors produced up to Nov. 1. Work is to be speeded up at both the plants, La Crosse and North La Crosse, and shifts will work 22 out of the 24 hr.

Green to Supervise Maxwell Zone—E. M. Green has been appointed zone supervisor for the Maxwell Motor Sales Corp. of Detroit. Mr. Green formerly was the Boston supervisor for the Maxwell company.

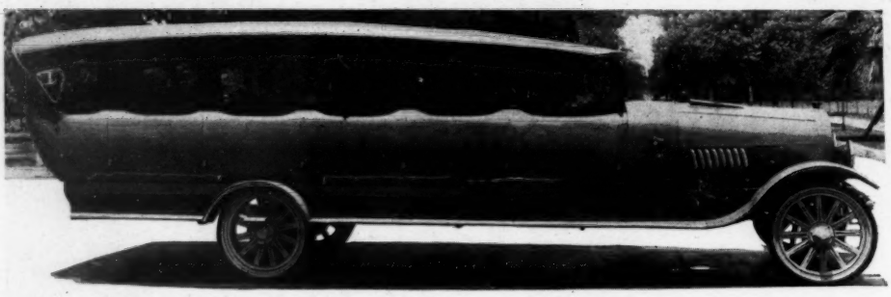
Nash Distributors Meet at Factory—Twenty-nine distributing companies were represented at a three-day convention at the Nash Motors Co., Kenosha, Wis., recently, and orders for more than $37,900,000 worth of passenger cars and several million dollars' worth of trucks were placed.

Compensates Employes for Lower Farm Wages—The Ford Motor Co. of Canada will pay all of its employes who are working on farms at this time the difference between what the farmers pay and the company's wages. The company has 100 of its employes engaged at present assisting with the harvesting of crops.

Lawson Begins Aircraft Construction—The Lawson Aircraft Corp., Green Bay, Wis., has been incorporated with a capital stock of $200,000, by Alfred W. Lawson, William Hoberg and George W. Ellis, under whose direction a large plant for the manufacture of complete airplanes was established in Green Bay several months ago. Mr. Lawson is an aero-engineer and his staff includes as designers John Carisi, Lawrence Allison, Lee Wallace and Rudy Sanders. Production is now under way.

Parts Companies Merge—The Morrill & Morley Mfg. Co. and the Electric Specialties Mfg. Co., Benton Harbor, Mich., have merged their resources and will operate under the name of the Benton Harbor Auto Machine Co. The company has authorized capital stock of $174,000, of which $87,000 is paid in. The two concerns were engaged in making motor car parts. Officers of the new company are: President, J. N. Klock; vice-president, L. N. Allen; secretary, H. S. Gray; treasurer and manager, R. C. Eisley.

From the Four Winds



HOW VISITORS SEE LOS ANGELES—Passengers of this "rubberneck" bus see the sights of Los Angeles from an unusual vehicle. It is covered by what is claimed to be the largest one-man top ever built, 15 ft. long. The body is streamline with a cowl back of each seat. Forty-two passengers may be accommodated at one time. The top and body were built in the shop of George R. Bentel, Los Angeles

TO Advertise B. and Y. Trail—Officers of the Black and Yellow Trail Association have decided to publish a pamphlet advertising the route. Each vice-president of a county will confer with the commissioners in his county and have his section of the trail remarked within the coming two weeks.

Wisconsin Owners to Aid Harvest—Motor car owners of Wisconsin have been appealed to by the state council of defense to help harvest the 1917 grain crops of the Badger state. A flying squadron is being enlisted to take labor to and from the fields in various parts of the state. Kenosha county is the first to organize a squad and many women have enlisted not only their cars but their own services.

Motor Truck Tries Hand at Harvesting—Farmers in the Northwest are watching the experiment being conducted on a 15,000-acre farm near Walla Walla, Wash., with motor trucks in hauling grain. A truck hauls wheat from two combines, on each of which has been built a 100-bu. bin. The truck takes the wheat from the two bins and dumps it into a concrete elevator while the combines are filling their bins for the next load.

Tires at $500 Per!—American motorists should rejoice that the largest tire factories are within their country, according to Count Richard Hamilton, representative of A. V. Holm, of Stockholm, who looks after the Peerless business in Sweden. The count tells of a friend who learned two rear tires were for sale just outside of Stockholm and bought them at an exorbitant price. Persons followed him all the way home, seeking to buy the tires. The highest bid was equivalent to $500 in American money for each tire.

Rochester Club Holds Orphans' Outing—Street car and other traffic at Rochester, N. Y., was suspended temporarily when the Rochester Automobile Club gave the orphans of the city a day's outing. The parade which led to the park contained 350 cars and was enlivened by two bands and soldiers who assisted in directing and parking the cars. The mayor and other city officials took part. More than a thousand children from the eight orphanages were entertained, and it is planned to repeat the outing next year.

Canada and Illinois Exchange Privileges—Secretary of State Louis L. Emmerson has been advised by the department of public highways of Ontario that the reciprocal interchange of motor vehicle privileges between Illinois and Ontario is now an established fact. Illinois motorists heretofore have been unable to tour Canada without a great deal of trouble, as the Illinois license was not recognized by Canada. Through the efforts of Secretary Emmerson the last session of the Illinois assembly amended the motor vehicle law, though it will not be effective until Jan. 1. However, Mr. Emmerson has obtained the consent of Canadian officials to make the reciprocal arrangement effective at once.

Car Climbs Mount Spokane on High—Cliff Evans and William Barnard, two motorists of Spokane, Wash., drove a four-ninety model Chevrolet to the summit of Mount Spokane, locked and sealed in high gear. The distance of the run was 34 miles and was covered in 1 hr. and 18 min., averaging 26.2 m.p.h. for the steep mountain road.

Wisconsin Receipts Increase During Year—Receipts for motor vehicle license fees of all classes reported by the state of Wisconsin for the fiscal year, ending Aug. 1, amounted to $834,142, compared with a gross of $575,798 for the previous fiscal year. The cost of administration was $39,069, and after this sum is deducted, 25 per cent is placed in the state highway fund and 75 per cent is redistributed pro rata among the seventy-two counties of the state where licenses originated. During the new fiscal year, receipts will increase even more, as the annual license fee for private owners has been increased from $5 to $10 per annum, effective Jan. 1, 1918.

Motor Truck Shows War Value—The possibilities of the motor truck in war work are indicated by the performance of two Overland 1200-lb. delivery wagons which hauled 75 tons of supplies and ordnance 3½ miles in a little more than 8 hr. The hauling was done at the mobilization of the Colorado National Guard at Camp Baldwin.

Truck Completes 10,000-Mile Trip—A 3½-ton Sanford truck has just undergone a 10,000-mile test run from Syracuse east and through New England. The trip was made without serious delay in spite of heavy rains. To be sure a bridge in the Alleghenies caved in under the truck, leaving it suspended in mid-air on the crossbeams, but the truck was jacked off safely.

Tours Route of Proposed Military Road—R. W. Emerson, of Seattle, secretary of the Pacific Coast Defense League, has commenced a run over the proposed military highway from Blaine, Wash., to Tiajuana, Mexico, to obtain data for congressional committees on the bill providing for the establishment of the road. No stops will be made except for meals, and Mr. Emerson will attempt to shatter the Canada-to-Mexico record.

Michigan Gets $2,225,401 in Fees—Michigan during the first six months of this year licensed 160,258 passenger cars, 18,179 commercial cars, 832 dealers, 14,250 chauffeurs and 7495 owners of motorcycles. The fees collected by the state during the first half of the year are divided as follows: Passenger cars, $1,968,130.14; trucks, $145,962.93; motorcycles, $16,881.60; dealers, $41,369.10; chauffeurs, $28,499; transfers, $4,983; duplicates, $19,575; making a total of $2,225,401.02. Of this amount the state highway fund received $1,140,201.34, and the remainder, $1,085,199.68, was pro-rated among the various counties according to the number of cars.

Truck Club Outing a Success—The sixth annual outing and ladies' day of the Motor Truck Club of America was held recently with 142 members and their guests in attendance. The affair included a boat ride on a chartered steamer from New York to Glenwood Landing, L. I., a baseball game, athletic events and dancing. The baseball game between owners and dealers was won by the dealers. The most unusual event was a bull-throwing contest. The bull was a 12-lb. lead casting, and the prize was won by Joseph Husson, editor of the Commercial Vehicle, with C. D. Studebaker, manager of the New York Firestone branch, a close second. The outing was voted the most successful held by the organization.

Coming Motor Events

CONTESTS

Sept.	3—Uniontown, Pa., speedway race.
*Sept.	3—Cincinnati, Ohio, speedway race, championship.
Sept.	6—Red Bank, N. J., track race.
*Sept.	15—Providence, R. I., speedway race, championship.
Sept.	22—Chicago speedway race.
Sept.	28—Trenton, N. J., track race.
*Sept.	29—New York speedway race, championship.
Oct.	6—Danbury, Conn., track race.
Oct.	6—Uniontown, Pa., speedway race.
Oct.	15—Richmond, Va., track race.
*Oct.	13—Chicago speedway race, championship.
Oct.	27—New York speedway race.

*A. A. A. championship award event.

MEETINGS

Sept.	12-14—Atlantic City, N. J., Motor and Accessory Manufacturers, mid-season meeting.
Oct.	9-11—Pittsburgh, Pa., National Association of Purchasing Agents, annual congress.

SHOWS

Sept.	2-9—Spokane, Wash., Interstate fair.
Sept.	9-15—Milwaukee show, State Park fair, West Allis, Wis.
Sept.	17-24—Grand Rapids, Mich.
Sept.	22-29—Chicago, Ford accessories.
Oct.	1-6—Buffalo, N. Y., closed cars.
Oct.	13-28—Dallas, Tex., state fair.
Jan.	5-12—New York.
Jan.	19-26—Montreal, Canada.